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CHIRURGICAL

OBSERVATIONS

AND

CASES.

VOL. I.

CHIRURGICAL
OBSERVATIONS
AND
CASES.

BY

WILLIAM BROMFEILD,
SURGEON TO HER MAJESTY'S HOUSHOLD,
AND TO ST. GEORGE'S HOSPITAL.

IN TWO VOLUMES.
Illuſtrated with COPPER PLATES.

VOL. I.

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TO

DR. LAWRENCE,

PRESIDENT OF THE ROYAL
COLLEGE OF PHYSICIANS, &c.

SIR,

WHILE I acknowledge my obligations to you, for the condeſcenſion of reading this work before it was delivered to the preſs; I no longer deſpair of the attention of the publick: ſince, what you have thought worthy to be laid before them, I may humbly hope they will find ſo.

The

The favourable manner in which you have been pleaſed to ſpeak of the practice herein recommended, I cannot attribute merely to your general candour, or to the partiality, with which you are pleaſed to think of me; ſince the ſubject is too ſerious for compliment, and the lives of men too important to be ſacrificed to civility; nor will I doubt, but that even your friendſhip would have ſuppreſſed the work, had there been any thing ſuggeſted in it, that reaſon and anatomy would not authoriſe and ſupport.

Poſſeſſed, Sir, of your approbation, I cannot fear the cavils of criticiſm, ſince your erudition has claſſed you with the firſt of the learned world, and your anatomical, as well as medical eminence, have repeatedly placed you, by the ſuffrage of the beſt judges, at the head of the Royal College of Phyſicians, who will give me leave to add, that their choice did honour both to themſelves, and to the inſtitution. I am, with the greateſt reſpect,

SIR,

Your much obliged,

and obedient humble Servant,

WILLIAM BROMFEILD.

Conduit Street,
Dec. 10, 1772.

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CHIRURGICAL OBSERVATIONS.

CHAP. I.

THE obligations we are under to the earlieſt writers in ſurgery ſhould ever be acknowledged with the higheſt reſpect to their memory, as to them we are indebted not only for the general principles of that art, but alſo as they have delivered, with great exactneſs, the ſigns by which the diſorders medicable thereby are diſtinguiſhed, and, as they were the inventors of almoſt every operation now in uſe, with ſome others, which men of no inconſiderable judgment and experience have wiſhed to ſee revived. The labours of ſucceeding ages have by little and little improved what they had received from the ancients, and, in ſome inſtances, added to the old ſtock; but the profeſſors, who flouriſhed from towards the end of the ſeventeenth century to the preſent time, have made a greater progreſs in this branch of the art of healing, than all the ſurgeons, who lived between them and *Galen*.

THE inquiſitiveneſs, induſtry, and ſucceſs of the modern anatomiſts, have been the principal occaſion, as well as the foundation of the late improvements in ſurgery, and of its haſty progreſs towards perfection. What was formerly purſued only by a few, and that with languor and diſguſt, is now ſought after by moſt with vigour and curioſity. What moſt ſurgeons were contented to believe upon the credit of books, is now learned from the inſpection of diſſected bodies; and there is ſcarce a man in *England*, who thinks himſelf qualified to practiſe ſurgery, (even in thoſe parts of the country the moſt remote from *London*, and the obſervation of ſkilful men) till he has by hearing anatomical lectures, and attending diſſections, gained a competent knowledge of the ſtructure of the human body.

MOREOVER, the benevolent diſpoſition of our countrymen, by erecting hoſpitals in ſo many parts of *England*, has diffuſed the knowledge of ſurgery through the kingdom, opening, as it were, ſo many ſchools, in which that art is taught by the beſt inſtructors, Nature and Example. Though under theſe advantages almoſt every operation in ſurgery has been ſo much improved, and ſo plainly taught, that, as it may ſeem to ſome men, ſcarce any thing further is to be expected, yet the experience of every day may convince us, that there is ſtill a large field to traverſe, which has not yet been trodden.

ON the other hand, there are ſome difficulties, which lie in the way of further improvement. An attempt to reform an error in practice is often very unworthily treated, from either the pride or obſtinacy of thoſe, who ſcorn to be taught by others, or think themſelves too knowing to need any information. The fear therefore of being treated with unjuſt and ſupercilious criticiſm, or of giving offence to men of eſtabliſhed character, it is to be ſuſpected, has prevented many a modeſt and ingenious man from communicating his remarks to the public. The diſcoveries, which genius and aſſiduity have made, have not always been conſidered, and received as their importance deſerved: many obſervations have been rejected as trivial, and worth no regard, which, if carefully attended to and weighed, might have proved of great value; nay, farther, many things, ſtrange and paradoxical at firſt ſight, might, upon due conſideration, have been allowed, and been univerſally received as high improvements.

ANOTHER obſtacle to the progreſs of ſurgery has been a dull and lazy acquieſcence in the eſtabliſhed methods of operating, as if every deviation from the common way ought to be eſteemed, at beſt, as an uſeleſs refinement upon what experience had taught us was ſufficient for our ends. Can any thing be more obvious than the advantages of the double inciſion in amputations? Yet ſuch is the obſtinacy of ſome, that, even to this preſent hour, they cut quite down to the bone by one ſingle turn of the knife, rather than receive the practice recommended by a *contemporary*. How advantageous are the hints of profeſſor *Monro* in the Medical Eſſays of *Edinburgh*, relative to the operation of amputation? Yet, in general, they are as little regarded as if they had never been made public.

It is certain, that real improvements in the art are not always at firſt received with that candour, which even an attempt to aſſiſt our fellow creatures under the greateſt diſtreſs deſerves. Jealouſy too often ſets every engine at work to prevent the innovation from being adopted, unleſs integrity and humanity give an early check to its malevolent efforts.

FOR glaring inſtances of this, we need only refer to *Harvey*'s circulation, inoculation, and the uſe of the *Peruvian* bark. Nevertheleſs I am of opinion, that even this diſpoſition may, in ſome inſtances, have had its uſe, by preventing abſurdities being obtruded on the public, and brought into practice, merely on account of their novelty.

HYPOTHESES indeed can have but little weight, till confirmed by repeated experiments; and ſo ſuſpicious am I of partiality in ſuch caſes, that I dare not even truſt myſelf with the accounts to be taken when trials are making, and facts in conſequence thereof to be aſcertained. I therefore in ſuch enquiries always employ ſome perſon, who, not being acquainted with the plan, conſequently cannot propoſe to the patient any leading queſtion, that might ſeduce him from the paths of truth. There is required more reſolution than I have always been maſter of, to introduce an improvement of my own, immediately into practice, where it has happened that people of the firſt rank in the profeſſion of ſurgery, in ſome points, have thought differently from myſelf; but when trials have been ſucceſsfully made by others, to whom I had communicated my thoughts on particular ſubjects, and aſcertained their ſucceſs, I ſhould then have thought myſelf deficient in humanity, if I had not taken the earlieſt opportunity of confirming ſuch improvement by my public practice.

The great veneration, in which the firſt writers in ſurgery have generally been held by each ſucceeding generation, has induced practitioners, in many inſtances, implicitly to believe their doctrine, and it has been counted preſumption, in the leaſt, to deviate from maxims eſtabliſhed by long tradition and general practice. Quotations from their writings have been deemed both reaſon and experience, and were generally concluſive in all arguments; and though ſome of the moderns, however grateful for the light our forefathers had given them, would not blindly ſubſcribe to their errors, yet others, even in this enlightened age, ſtill doat on antiquity, and copy devoutly the abſurdities of their predeceſſors.

BIGOTS there are in every profeſſion, and many in ſurgery, who from habit, prejudice, and falſe reaſoning, cannot fall in with any propoſal, which does not exactly coincide with their notions of things, particularly when offered by a younger brother; and after a peremptory diſapprobation declared by thoſe of the firſt rank in this profeſſion, few ſurgeons, I ſhould imagine, would be hardy enough to riſque their reputations in *making the tryal:* but here again we muſt be on our guard; for prejudice often becomes fixed from reaſoning on falſe facts. In concuſſions of the brain, do we not, from certain ſymptoms, often ſuſpect either obſtruction in the capillaries, or extravaſations of ſome of the circulating fluids? And in order to prevent miſchief, is it not the warranted practice to bleed and evacuate *uſque ad deliquium?* And is not this repeated, if the ſymptoms continue, till death convinces us, that this method will not *always* ſucceed? This practice is founded on our fixed idea of *inflammation*, viz. that it is owing to obſtruction in the veſſels from various cauſes, and kept up by a plethora; therefore emptying the veſſels, by every poſſible means, is ſuppoſed to be the only rational method of cure.

Should any man recommend a free uſe of *opium*, ſo as to produce a diaphoreſis in a concuſſion of the brain, would he not be thought either ignorant, or inſane? Or would not the generality of our preſent practitioners, if this patient ſhould die, think him deſerving the fate of poor *Groenvelt* for giving *cantharides* as a medicine? The gentleman, who firſt recommended the uſe of *opium* to me in fractures of the ſkull, or concuſſions of the brain, aſſured me, that his firſt inducement to make uſe of it in ſuch caſes was the ſucceſs of it, which he had obſerved in the practice of a celebrated empiric, who often relieved injuries done to the brain, and its meninges, by means of that medicine: and a ſecond cogent reaſon was, he had remarked that moſt of the patients, who had received hurts of that ſort, generally died, where emptying the veſſels *only* was the method for relief. On theſe principles, he ventured to make the experiment, and found it ſucceſsful, even beyond his moſt flattering hopes.

When I conſidered the aſſertions of this gentleman, I own I ſtill felt a reluctance to make the experiment, being influenced by the common prejudice ariſing from our obſervations, that *opium* frequently affected the head to a violent degree, and conſequently concluded, it muſt be improper, where the brain, or its membranes are already diſordered from external violence; but, if I am now right in ſuppoſing, that inflammations are frequently cauſed by ſpaſm, and that the nerves ſent to the muſcular or vaſcular fibres may be ſo irritated as to produce ſpaſm, this doctrine may be worthy of attention: for certainly *opium* is the moſt likely remedy to take off ſpaſm, as many of us, I dare ſay, have experienced in the moſt threatening caſe of that ſort, I mean, what is called, the locked jaw.

That *opium* is alſo a great attenuant of the blood, few will deny; and therefore, that it muſt give the faireſt chance for the abſorption of extravaſated fluids, and by dividing thoſe detained in the veſſels, fit them for future circulation. In confirmation of what I advance, I have the authority of experience communicated to me by that learned, that ingenious, that *elegantiarum arbiter et medicorum princeps*, Dr. *Mead*, who ſaid, that in caſe women would immediately make uſe of *tinctura thebaica* freely to their breaſts, after contuſion from a blow, or other violence received, the extravaſated blood would be attenuated and abſorbed, and the aſſiſtance of the ſurgeon's knife would rarely be wanted for cancers, conſequent to external injuries done to their breaſts.

THOUGH I may be cenſured for daring to recommend a doctrine ſo contrary to the preſent practice, yet I ſhall think it my duty to relate a few facts, in conſequence of my having given *Dovar*'s powder in hurts done to the ſkull and brain, and then ſay *liberavi* *animam meam*, and leave every practitioner either to make trial of this method, or reject it as he may think beſt for his patient.

I MUST acknowledge, that from prejudice and partiality to a practice admitted for many years, in conſequence of a theory, which on a more critical examination does not prove true, and, by halting between two opinions, I did not at firſt purſue either with firmneſs; for, in caſe the perſon was not greatly relieved, or rather freed from all complaint, by the firſt doſe of the medicine, I then had recourſe to evacuations, ſuſpecting a ſecond might do miſchief: but conſidering the impropriety of this irreſolute treatment of ſuch caſes, I determined boldly to perſevere in the new method, which was this: in caſe of fulneſs from a plethoric habit, to take away a few ounces of blood, that by giving room in the veſſels, the anodyne ſudorific might more ſurely act as intended, and, if the patient were coſtive, to procure a ſtool either by clyſter, or ſome lenient aperitive medicine.

The warm bath is, in general, a good preparative for the powder; for by cleanſing the ſkin, it cauſes the medicine to act more readily as a ſudorific, and by lying between blankets, perſpiration is greatly promoted during its operation: when this is over, the patient is to be put into well-aired ſheets. Should he be relieved by this proceſs, the practitioner will naturally wiſh to keep up a gentle diaphoreſis, which ſhould be done by a continuation of a medicine of the ſame kind, ſuch as the *vin. antimon.* with the *tinct. thebaic.*; but, *Aut non tentes, aut perfice*, ſhould be the maxim laid down: and to encourage thoſe, who would chooſe to try this method, I muſt add, that in general every ſymptom of concuſſion of the brain has gone off on the powders producing a plentiful ſweat; and, that the medicine was generally

rally continued, *pro re natâ*, till the patient ſeemed out of danger; and, where the ſymptoms have returned again, the medicine was repeated, and the patient did well.

I CANNOT ſay I ever knew any one the worſe for taking this anodyne ſudorific, though I have given it to hundreds; but, on the contrary, patients labouring under the ſymptoms of concuſſion, were by this method recovered, and, two in particular with fractures of the ſkull, without the operation of the trephine being performed.

A GENTLEMAN received a violent blow on the top of his head, from a large weight falling on it, which fractured his ſkull and depreſſed it: I attended at the operation, when every poſſibility of future preſſure on the brain from the fractured bone was entirely prevented by the removal of the depreſſed pieces. He took *Dovar*'s ſweating powder, which, he ſaid, always relieved him, when it began to operate. He had ſtools as often as was thought neceſſary, and was bled very freely before I ſaw him. As the wound did not begin to digeſt kindly at the uſual period, in the intermediate time between the ſweats, he took the *ſal abſinthii* neutralized with *ſuc. limonum*, and a decoction of *the bark*. About the fifth day he grew *comatoſe*, and, the gentleman, whoſe patient he was, ſeemed to wiſh he had been bled again. I deſired him to recollect how conſtantly we conſulted the pulſe when we met, and, that he had always told me, that in my abſence he was never induced to bleed him from fulneſs; and, from the quiet ſtate of his pulſe whenever we met, we judged it unneceſſary. This he allowed; but, as the *coma* was great, I conſented to his loſing ſome blood from the jugular vein, which did not make his pulſe flag, nor, was he relieved by the bleeding: when I ſaw him the next day, being the ſixth from the accident, he was dying. I did not ſee the patient after he died; but conclude, that the brain had ſuffered ſo much from the violence of the blow, that, let what method ſoever have been followed, the event in this caſe would have been the ſame.

JOHN KING, aged thirty-five years, having fallen from a ſcaffold, was brought to *St. George*'s hoſpital, on the eighth of *May*, 1771, quite ſenſeleſs. He had received by the fall two large wounds; one on the anterior, the other on the poſterior part of his head, and his back was violently bruiſed: he had bled a little at his noſe. Immediately after his admiſſion into the hoſpital, he was let blood, and, from the adminiſtration of a clyſter, had two ſtools, and took a ſcruple of *Dovar*'s ſweating powder. On the ninth he was more ſenſible, and complained of great giddineſs, with pain in his forehead and back. He was then ordered to take ten drops of the * *tinctura anodyna antimonialis* once in four or ſix hours, as the effect might indicate; a fomentation was applied to his back, a ſtool procured in the evening by a clyſter, and *Dovar*'s powder was repeated at bed-time. On the tenth, the giddineſs was gone off, the pain was abated, and his head was perfectly eaſy, the uſe of the *tinctura anodyna* was continued, and his body kept open by a laxative mixture. On the eleventh, he was free from all complaints, granulations began to appear on the wound, which looked well, and the uſe of the drops was diſcontinued. He remained well till the ſixteenth, about which time he was ſeized with giddineſs, and a ſickneſs at his ſtomach. Eight ounces of blood were then taken away, and ſome ſtools procured by a purging draught. On the nineteenth, the giddineſs and ſickneſs entirely left him. On the twenty-firſt, his ſickneſs returned, with great pain in his head: he was then directed to take a ſcruple of *Dovar*'s powder at night. On the twenty-ſixth, all his complaints were gone. He was then ordered to take four ſpoonfuls of the following medicine once in four hours. ℞ *Sal. abſinth.* ℈ii. *ſucc. limon.* ℥i. *decoct. cort. Peruvian.* ℥xiv. He remained without any return of his complaints, and was diſcharged on the twelfth of *June.*

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* ℞. *Vini antimonialis drachmas tres, tincturæ thebaicæ drachmam unam. Miſce.*

PATRICK DARBUN, aged twenty-ſix years, was admitted into *St. George*'s hoſpital the ſixth of *July*, 1771, having a large wound on the forepart of his head, and ſome ſlight bruiſes in different parts of his body. He had fallen from a ſcaffold. It was about an hour after the accident when he was brought to the hoſpital, where the ſurgeon was informed, that he had continued ſenſeleſs for half an hour after the fall, and had vomited twice. He had great pain in the parts that were hurt, with ſtupor and heavineſs. Upon a careful examination of the ſkull, no fracture could be diſcovered. Some blood had been taken away before he was brought to the hoſpital, where a purging mixture was given him, and ſome ſtools thereby procured. He then took a ſcruple of *Dovar*'s powder. He complained of great pain in his head, and giddineſs, on the ſeventh, and had had but little reſt. The *tinctura anodyna antimonialis* was given him, ten drops of which he took once in four or ſix hours. He was rather eaſier in the evening, and the *pulv. Dovari* was repeated at bed-time. On the eighth, he was much better; the uſe of the drops was continued. On the ninth, the pain in his head and giddineſs were quite gone. He continued to take the drops till the twelfth, about which time, he being perfectly well, no more were given. Having remained in the hoſpital till the thirty-firſt, without any return of his complaints, and the wound being nearly healed, he was made an out-patient by his own deſire, and continued perfectly well.

John Hyde, a boy about fourteen years of age, was on the ſeventh of *June*, 1771, admitted into *St. George*'s hoſpital, on account of a hurt he had received on his head by falling backwards. The ſcalp was much ſwelled, but without any wound: he complained of giddineſs, and vomited frequently. The ſurgeon made an inciſion into the tumified part, by which the ſkull was laid bare, and a fracture, of about an inch in length, diſcovered upon the ſuperior part of the occipital bone. Some ſtools were procured as ſoon as it was poſſible, by a purging mixture, and afterwards one ſcruple of *Dovar*'s powder was given. He had a pretty good night, and on the eighth the vomitings ceaſed, though the pain in his head and giddineſs continued. He was that day directed to take ten drops of the *tinctura anodyna* *anti-*

antimonialis once in ſix hours. His giddineſs went off entirely in the evening; but he complained of a little pain in the fractured part. A ſtool was procured by a clyſter, and the uſe of the *antimonial anodyne* was continued. On the ninth, he was free from pain, and took the *antimonial anodyne* once in ſix hours, till the eleventh, during which time he was perfectly well, and afterwards was directed to take the neutral mixture, with a decoction of the *Peruvian* bark. This courſe he purſued for about a week, and on the twenty-ſixth was made an out-patient. In about three weeks after this, the wound was healed, and the boy perfectly recovered. There was nothing particular in treating the wound, except that the bone was frequently pricked with the point of a proper inſtrument, to expedite exfoliation.

I HAVE fairly related things as they were, and ſhall make no other remark on the facts than this, that had the caſes of concuſſion, which were *in the hoſpital*, been fractures of the ſkull, and the uſual openings been made with the trephine, the greater part, I firmly believe, would have died; at leaſt, I may venture to ſay, it has generally been the caſe, even under the care of the moſt able and experienced ſurgeons, not only of the hoſpitals in *England*, but in *France*, *Italy* and *Germany*, where I make no doubt but that evacuations were repeatedly made, as occaſion might require. I flatter myſelf, that ſome unprejudiced perſons of the profeſſion may, like me, be induced to try this method with that firmneſs, which a ſincere inclination to benefit our fellow creatures requires; and, be the ſucceſs what it may, it ought to be communicated to thoſe who profeſs ſurgery, for the improvement of the art: let truth prevail, though the preſent doctrine, enjoining great and repeated evacuations, ſhould ſuffer a little.

THERE cannot be any one, who profeſſes the art of ſurgery, but muſt have ſeen great advantage from drains or iſſues, made either by cauſtic or inciſion, on particular parts of the head or body, according as the caſe might require. Some phyſicians give preference to ſetons, as the diſcharge is thereby more conſiderable.

I SHALL not take up the time of my readers, by relating the method of making iſſues, or paſſing the ſeton needle in *the uſual places*; but, as there may be ſome, who have not experienced the happy effects of diſcharges from an opening made between the ribs for complaints in the *thorax*, I ſhall make ſome obſervations on this ſubject. The part, where the greateſt pain is felt, ſhould in general determine where the opening ſhould be made; and, as the ſkin is always looſe in emaciated people, the ſpace *between two ribs* ſhould be marked with a pen and ink. The ſkin being raiſed by an aſſiſtant, the marked line is to be cut through with a lancet. This inciſion ſhould be of ſufficient length to contain two peas, or a piece of dried gentian root, as may be thought beſt; but great care muſt be taken, in order to keep it open, not to introduce a freſh pea ſo large as the opening, when dilated by a former: for, in caſe it ſhould preſs in the edges of the ſkin with it, the iſſue will heal underneath; and, though a large cavity remains, from the preſſure of *the plug*, yet, no diſcharge will be obtained, and the expectation of relief fruſtrated. In caſes, which threaten to terminate in a conſumption, drains from between the ribs, if timely made, have proved aſtoniſhing in their effects. It is poſſible, that I may be miſunderſtood from what I have related above, as ſuppoſing theſe openings are only ſerviceable when there is a fixed pain in the *thorax*: therefore, I will explain myſelf further by ſaying, that when any humour has fallen on the lungs, tho' there be *no* *fixed point of pain*, and, the ſymptoms have not immediately yielded to medicine, I ſhould, under ſuch circumſtances, adviſe a drain to be made between the ſixth and ſeventh of the true ribs, about the midway between their articulations with the *vertebræ*, and their connections with the *ſternum*, which will be the moſt dependant part, when we ſit up, for the *tranſudation* from the *thorax*, of that thin diſcharge generally very abundant in theſe caſes.

I CANNOT quit this ſubject, without communicating a piece of advice given me by the late Sir *Hans Sloane*. When the lodgement of water or matter, in one, or both ſides of the *thorax*, is ſuſpected, from the apprehenſions of cenſure, many ſurgeons decline performing the operation for the *empyema*; for, ſhould they make an inciſion into the *thorax*, and no diſcharge of water or *pus* follow, but, air ruſhing out, produce a noiſe very alarming to the by-ſtanders, and the patient die ſoon after the operation, it might be whiſpered, that his death was occaſioned by the ill performance of the operation. A prejudice of this kind is not eaſily removed, though, the reaſon of the practice, is ever ſo well explained by the moſt ſkilful ſurgeons: But, ſaid Sir *Hans*, where ſuch opening is wiſhed to be made into the cavity, deceive the patient, for his own good, by telling him, that "a cauſtic applied on the part has often been of great ſervice in ſuch diſorders, and, if neceſſary, may be made into an iſſue when the eſchar ſeparates." When the cauſtic has done its duty, you take an opportunity with the point of a lancet to inform yourſelf, whether any extravaſated fluid is contained; and, if you perceive it to follow the lancet, you muſt enlarge the opening ſufficiently to let out the contained fluid, and, take credit to yourſelf: but, in caſe there ſhould not any water or matter iſſue through the puncture, you dreſs the *eſchar*, as uſual, till it is thrown off, and may make an iſſue of it for a time. Though this may be thought *a piece of deceit*, yet, I own, I think it commendable, as it is for the benefit of the patient: no harm can happen by the trial, and, it is effected without riſquing the ſurgeon's character.

For the diſcharge of humour from the meninges of the brain, cauſtics have been frequently applied on the courſe of the *ſagittal ſuture*, and, that extremity, which terminates in *the coronal*, has uſually been thought more eligible, from its being the part which is laſt oſſified in children; nevertheleſs, in adults we find, that the bones in this part of the ſutures are oftentimes united by *ancyloſis*, which, will therefore prevent any communication, between the external integuments, and the *meninges*; conſequently the intention of diſcharge to be obtained from within, muſt be fruitleſs, when the ſutures are in this ſtate. Now, when the ſuture is in its natural ſtate, the effects of a cauſtic, or the removal of a piece of the ſcalp by a knife, may prove dangerous, if not fatal; for, conſidering the ſituation of the fontanel, it is more likely, that the matter made therein ſhould paſs through the interſtices of the ſuture, and lodge on the *dura mater*, than that any thing within the ſkull ſhould make its way outward through theſe interſtices, particularly, when we are in an erect poſture.

I REMARKED the impropriety, as well as hazard of making iſſues on this part, and, gave my reaſons to my pupils, above thirty years ſince, in my lectures; and was then told by ſome gentlemen, who at that time attended ſome of the hoſpitals, that my apprehenſions were well grounded; for they had ſeen ſeveral, who had died after openings had been made on that part of the ſutures, and, upon inſpection found immediately under the opening, the *dura mater* foul and ſloughy, which, from the ſymptoms conſequent to the iſſue being made, they believed brought on death. It is poſſible, that the *longitudinal ſinus*, being ſituated immediately under that part of the *ſagittal ſuture*, where the fontanel is recommended to be made, may have been a ſtrong inducement for aſſigning ſome place in the courſe of this ſuture for an opening.

As I had great reaſon to believe, that where any lymph had been extravaſated, and lodged between the ſkull and *dura mater*, in caſe any of the ſutures ſhould remain open, and a dependent ſituation for the exit of the extravaſated fluid could be obtained therefrom, it muſt be extremely ſerviceable. I examined the ſkulls of various ſubjects, and found, that the *additamentum* of the *temporal* or *petroſe ſuture* was almoſt always open; that, its ſituation was the moſt favourable for any diſcharge from within the *cranium*; that, it had the advantage, if it be any, of being ſituated on one of the great *ſinuſſes*; and that, through an inciſion made throughout the whole length of this *additamentum*, diſcharges might be expected, not only from that part of the membrane that covers the *cerebrum*, but alſo, from that which incloſes the *cerebellum*.

THE great advantages I have ſeen from diſcharges obtained by inciſions, made *properly* on this piece of ſuture, make me recommend them ſtrongly, where ſome ſymptoms remain in conſequence of violent concuſſions of the brain, of which ſymptoms extravaſation of lymph may be ſuppoſed to be the cauſe. They have not been leſs beneficial in caſes of the *gutta ſerena*, conſequent to extravaſated fluid lodged on the optic nerves, after falls, or blows on the head. In epileptic fits, they have likewiſe been of the greateſt ſervice when kept open by peas or gentian root. After patients had been greatly relieved by the diſcharge for a few days, I have filled up the openings with doſſils of dry lint rolled up very hard, and bound down tight: the conſequence was, the ſymptoms returned as bad as ever. This was very remarkable in a girl, who, being ſubject to *the epilepſy*, was ſo far relieved by this method, that, after having an hundred fits in a day, ſhe had not more than two in the ſame ſpace of time, after the opening above recommended had been made, and diſcharged freely; but, it being doubted, whether the benefit aroſe from the opening made on the future, it was judged expedient to fill the fontanel with dry lint; but immediately upon the confinement of the diſcharge, the fits returned as frequently as ever. After having mentioned my ſucceſs to ſeveral of the profeſſion of ſurgery, this method was tried by others, and, in ſome patients, I was told, it was attended with advantage, in others without; but in thoſe I ſaw, where it had not been ſerviceable, the fault was evidently in the operator, as the openings had not been made exactly *on the ſuture*, conſequently no diſcharge from within could be expected.

I WILL mention a caſe, to ſhew the danger of attempting to introduce any new practice from the want of candour in ſome, who, inſtead of weighing carefully the probability of ſucceſs from the operation propoſed, pointing out any defect that may appear, and, ſuggeſting an improvement, immediately take occaſion from a bare event, without farther enquiry, to condemn what has been done, as a dangerous innovation.

A YOUNG woman, turned of twenty, had a *gutta ſerena* in each eye, which had been preceded by a violent headach, many years before the total loſs of her ſight. It was agreed to make inciſions on the *additamenta* of the *temporal ſutures:*

a ſmall diſcharge enſued, and the inciſions were kept open for a conſiderable time, without the leaſt benefit to the patient. At length, ſhe was ſeized with an epidemic fever, and died. The cauſe of her death, was immediately proclaimed to be owing to theſe inciſions, that the matter had gained a way through the ſutures, had inflamed the *dura mater*, and had brought on the fever, which, had occaſioned her death; but, luckily for the operator, the ſutures *univerſally* were not only cloſed, but, ſcarcely the leaſt veſtige of them remained in any one part of the head. The miſchief, ſuppoſed to be done to the *dura mater* from theſe external openings, was then found to be impoſſible. When the *cranium* was ſawed through, and taken off, the *dura mater* appeared as ſound, and as well, under the *additamenta*, as in any other part of it. On examining the brain, in the anterior ventricles, a very large tumor from the medullary ſubſtance, as big as a golden pippin, was found reſting on the *thalami nervorum opticorum*, and, the ventricles diſtended with near two ounces of lymph. From theſe appearances, I think, we may venture to account for her former violent headachs, and conſequent loſs of ſight. The ſutures being totally obliterated, the uſual advantages of tranſpiration, by the communication of veſſels between the internal membranes, and external integuments of the ſkull, was denied, conſequently the veſſels of the brain became greatly diſtended, and occaſioned that violent headach. This ſurcharge of the veſſels, was at laſt conveyed into the anterior ventricle, and an excreſcence, or exuberance being produced in this cavity, its preſſure on the *thalami nervorum opticorum*, prevented the nerves from doing their office, and the *gutta ſerena* muſt have been the conſequence of that preſſure. I ſhall not make any further comment on the behaviour of ſome of my brethren on this occaſion; but wiſh that, in future, the

the benefit of the patient may always be uppermoſt in our thoughts, and, ever have the greateſt influence on the judgment made upon an innovation in practice, when propoſed with candour and a benevolent intention. As it is the fartheſt from my thoughts to give offence to any gentleman of the profeſſion, I hereby declare, that I write not againſt men, but againſt what ſeem to me errors in the art, ariſing merely from cuſtom; and whenever I differ from thoſe of ſuperior abilities, I muſt hope, they will either publickly or privately deliver their ſentiments to me, as no one, I hope, is more open to conviction than myſelf, or readier to retract any error I may have publiſhed, as I have no other point in view but the public good; and, notwithſtanding what I have hinted of the inattention, or prejudice of ſome of the faculty, to the remarks of others, I ſhall ſtill think it my duty to communicate ſuch obſervations as I have made, and, which, I am convinced, can either ſave pain to the patient, in the following operations, or facilitate his cure after they are performed; and, when theſe are the principles on which any man acts, all apology for becoming an author muſt be unneceſſary.

If any perſon ſhould think the detail, in ſome of the following inſtances, too particular, I wiſh it may be remembered, that, in the whole of thoſe obſervations, I have endeavoured to be uſeful to ſuch practitioners, who ſeldom or never have had an opportunity of ſeeing the operations performed.

CHAP. II.

ON AMPUTATION.

THE operation of amputation is more frequently performed than moſt of thoſe contained in the chirurgical liſt, which are called *capital*; conſequently one would conclude, that experience ſhould have made us perfect: but I flatter myſelf, that ſome hints which I have given in the following pages may be acceptable to thoſe, who are not acquainted with *that part of the practice* in this operation, which I wiſh to inculcate.

PREVIOUS to the deſcription of this operation, it will not be improper to enumerate the complaints that require the removal of a limb, in order to preſerve life.

MORTIFICATIONS of the extremities have generally been reckoned among the diſeaſes that at laſt require amputation. The principal trunk of the artery, either of the ſuperior or inferior extremity, being wounded, for the generality, requires the limb to be taken off. Abſceſſes or caries within the joints, or wounds of their ligaments, rarely do well, unleſs the operation be performed above the diſeaſed part. A *ſpina ventoſa*, a carious bone of long ſtanding, ariſing either from old ulcers, or a ſcrophulous habit of body after deep and repeated exfoliations, are likewiſe in the catalogue of diſeaſes, for which this operation is performed.

IN compound fractures alſo, though often cured without, yet ſometimes, from the great comminution of the bones, eſpecially if the fracture be in or very near a joint, and where the ligaments are torn, the taking off the limb, as ſoon as poſſible, gives the beſt chance for the patient's recovery.

Those, who have ſeen the greateſt number of caſes of this kind, will probably be moſt cautious in determining what ought to be done, as they muſt have repeatedly ſeen inſtances that were very alarming, and unpromiſing of ſucceſs, from the obliquity of the fracture, the protruſion of the bone, with ſome comminution of the fractured limb, and the wound being large; yet ſometimes, under all theſe diſadvantages, by extracting every piece of bone that was ſeparated, cutting off every ſharp point that might irritate during the cure, replacing the bones, laying the limb in a proper direction, and preſerving it ſo by bandage, we all know, that it is no uncommon thing for patients to do well: therefore, an attempt to ſave the limb, even in ſuch caſes, is frequently commendable.

On the other hand, where the wound has been very ſmall, no appearance of great contuſion, no conſiderable comminution

minution of the bones, nor ſharp points protruding, though theſe are very flattering circumſtances, and would encourage the ſurgeon to try every method to preſerve the limb, yet, on a ſudden, a mortification may come on, and we then wiſh we had taken it off as ſoon as we were ſent for. Another very diſagreeable circumſtance is too often the caſe, that is, various abſceſſes form in different parts of the limb, and where the diſcharge is likewiſe very thin and great in quantity, the patient may ſink under it. We alſo frequently obſerve, that ſome of the matter of theſe abſceſſes is taken up by the abſorbent veſſels, and tranſlated to the liver, lungs, or ſome other *viſcus*, either of the *thorax* or *abdomen:* ſometimes the matter has been thrown on the brain or its *meninges*, and the patient been carried off very ſuddenly. We then are concerned, that an attempt to ſave the limb had been made. There are ſo many things to contend with, during the proceſs of cure in compound fractures, that I am not at all ſurpriſed, that ſurgeons are rather inclinable to amputate, if the contuſion of the parts is violent, and the tendons, or ſurrounding membranes of the muſcles, are conſiderably lacerated; but I own, from the very great ſucceſs I have ſeen, where the *long ſplints* have been uſed, I might ſometimes be likely to err in judgment, by attempting a cure without amputation, when the chances were rather againſt the patient's recovery. I have ſeen two caſes in particular, in which the neceſſity of amputating was to the ſurgeons, who attended the patients, ſo clear, that I was ſent for only to concur with them in opinion, and as a farther ſatisfaction to the patients and their friends; but, when I told them of the ſucceſs I had had in many inſtances of the kind, they very humanely gave way to my recommendation of the attempt to ſave the broken limbs, which, ſucceeding, I am convinced gave them the greateſt pleaſure. However I may be cenſured by ſome of my brethren for my way of treating the following caſe, I will relate it. A woman, far advanced in years, had the misfortune to break off a conſiderable part of the *tibia*, near the ancle. The end of the bone made its way through the ligament of the joint, when the nature of the fracture was obvious, as only two thirds of the extremity of the *tibia*, covered with its cartilage, appeared through the wound; the other part, about two inches in length, which was broken off from the *tibia*, remained in its ſituation, attached to the *fibula*. The foot was turned round, and the bone in its exit had entangled ſome of the tendons with the *ſpicula* of the fractured bone, and forced the tendons out of their places. The diſtortion of the limb, the length of bone protruded, as well as the wounded tendons, and lacerated ligament of the joint, were very unfavourable circumſtances, eſpecially at her time of life, to the attempt of ſaving the limb; but the ſucceſs juſtified our conduct: for, the tendons being diſengaged, the bone replaced, and the limb put in a proper direction, by the uſual dreſſings and a proper regimen, the fractured leg was not only preſerved, but the perfect uſe of the joint likewiſe: and all this I attribute to the *long ſplints*, and proper ſituation of the limb.

BUT in youth we obſerve very aſtoniſhing effects, eſpecially where Nature exerts herſelf; and, though even after our beſt endeavours, in ſuch caſes as I am ſpeaking of, the fractured limb may not be quite ſo ſtraight and even as it was before the fracture, and of equal length with the other, yet this is generally true, that any natural leg is better than a wooden one. But as I would not miſlead in the caſe of compound fractures, I therefore declare from experience, that where things are ſo circumſtanced, that the operation is unavoidable, the ſooner it is done, the greater will be the chance of ſaving the perſon's life.

THE ill effects of ſuppreſſing habitual diſcharges, by the healing of old ulcers, have made me not quite ſo ſanguine for amputating merely for a *caries*, which is the effect of ſuch kind of ſores, Nature having fixed on the ulcerated part as the outlet of ſome noxious humours, which will not, without danger, be totally ſtopped, though but for a very few hours; for, by the application of dry lint and a little flour on a ſtump, after the operation, to prevent the weeping of the capillaries, the patient has ſometimes been carried off in twenty-four hours, before any digeſtion could come on; but, if the operation ſhould be recommended, ſuch applications and medicines as will forward digeſtion will be very neceſſary, and I believe none are better than *bark* and *opium*; and, if our endeavours ſucceed to our utmoſt wiſhes, it ſhould be laid down as a rule, not to be departed from, always to cut a fontanel in the other leg or thigh, before the ſore is healed, which will give a fairer chance for future health, than by neglecting to make ſome proviſion for the diſcharge of that humour, which had been the cauſe of amputation.

White ſwellings of the joints, as they are called, ariſing from a ſcrofulous habit of body, are alſo frequently thought proper caſes for amputation; but, without dread of being thought an oppoſer of this doctrine, I do declare, that, from the ill ſucceſs of the operation, which I have obſerved where the diſeaſe was not local, I am always againſt having it performed: for, as I have ſo repeatedly ſeen the humour thrown upon ſome other joint, after a finger, toe, leg or arm, has been amputated, I cannot but join in opinion with a very eminent and judicious ſurgeon, who, when a limb was propoſed to be amputated for a ſcrofulous complaint, for which two or three fingers had been already taken off, ſaid, it was beſt in all thoſe caſes, if amputation was inſiſted on, to begin with the head, which would ſave many other operations. In that ſubject, the reproof was certainly very proper; for, till the habit of body is altered, any farther operation than letting out matter, when collected, is cruel; and thoſe who will not give credit to what I aſſert, may depend on this, that, if they make it a rule to amputate every joint that becomes diſeaſed from ſcrofulous leaven, they will ſooner or later be convinced of their error, from the miſerable ſtate of their mutilated patients, which, to a man of humanity, cannot be pleaſing.

When the joints become the ſeat of ſome critical depoſit of a malignant fever, or the glands of the joint from contuſion ſuppurate, and the acrimony of the matter has eroded the cartilages of the heads of the bones, and the ligaments of the joints are deſtroyed, the caſe is then as clear for the operation, as where the principal artery of either of the extremities is wounded, or where an abſceſs in the marrow has made its way through the ſurface of the bone.

THE word mortification, in its preſent acceptation, is generally ſuppoſed to have place where the circulation is no longer performed through the diſeaſed part, which generally turns blackiſh, and becomes putrid, the ſeparation of which from the ſound fleſh is like an *eſchar*, in conſequence of a cauſtic having been applied. This ſtate of the diſeaſed parts by moſt writers is termed *ſphacelus*; and what they call a *gangrene*, we define an *incipient mortification*, or a great tendency to ſphacelate.

IN this ſtage of the diſeaſe, there is generally a very high degree of inflammation, and a conſiderable ſwelling of the parts affected, with ſome veſications, like thoſe from ſcalds, but of different colours, according to the extravaſated fluid, with which they are replete; ſometimes pellucid or yellow, at other times black or browniſh. While things are even thus far advanced, attempts ſhould be made to prevent a ſudden change to a *confirmed ſphacelus*; but, in order to effect this, it muſt be obſerved, that a tendency to mortify may be owing to very oppoſite cauſes: it muſt therefore be extremely obvious to every man of ſkill, that there cannot be any thing properly a ſpecific for a diſeaſe, where a *plethora* is the cauſe in one ſubject, and inanition in another.

In order therefore to fix ſome rational treatment of this dangerous diſeaſe, I will ſet down its various cauſes, both internal and external.

The internal are either dyſcraſy, as in a high degree of the ſcurvy, the *lues venerea*, or the remains of variolous matter in the blood, after the confluent ſmall-pox: all inflammations may terminate in mortifications, particularly thoſe of the eryſipelatoſe kind: a paralyſis, profuſe hæmorrhages, a rigidity of the arteries, old age, will abate the *momentum* of the circulating fluids; and, in caſe the languor is very conſiderable, the fingers or toes not only threaten ſoon to become gangrenous, but the progreſs to ſphacelation is often very rapid, under ſuch circumſtances: for, not only the *vis vitæ* is deficient, but the veſſels themſelves are frequently diſeaſed, and, though duly diſtended with blood, are incapable of reacting on the contained fluid, which conſequently in time muſt ſtagnate in the capillaries.

THE external cauſes are either violent contuſions, fractures, diſlocations, or gun-ſhot wounds; the extremities being expoſed to the ſeverities of the winter ſeaſon, the fingers, toes, hands, feet, nay legs and arms, do often mortify, and exceſs of heat we know has the ſame effect.

WHEN the ſkin looks red, is attended with heat, pain, tenſion, hardneſs, and throbbing, though but lightly tumified, we call the tumour an inflammation, and it is generally attended with ſome degree of fever.

WE muſt take notice likewiſe, that the internal parts, ſuch as the brain, and its *meninges*, the *viſcera* of the *thorax* and *abdomen*, and their inveſting membranes, are liable to inflammation; and whatever is capable of producing it in the external parts, will have the ſame effect on thoſe within.

INFLAMMATION is frequently conſequent to external injuries, ſuch as wounds, contuſions, fractures, or diſlocation. The dyſcraſy, or indiſpoſition of the fluids, whether venereal, ſcorbutic, or any other kind, may cauſe an effort of nature to get rid of it, which irritating the veſſels of that part, on which the morbid humour is thrown, an inflammation from an internal cauſe is produced; the conſequence of which is a fixed pain, with pulſation, and the uſual attendant ſymptoms of a fever.

The cauſe of inflammation may be either obſtruction of the blood, and its conſtituent parts, in ſome of the veſſels intended for circulation, or an extravaſation of the fluids. The ancients were of opinion, that inflammation was owing to the blood's being *derived* to the part affected. *Fernelius*, in his chapter on the *phlegmon*, ſeems to be of the ſame way of thinking, as he ſays, “ *Cauſa* “ *continens ſanguis eſt, non in ſolam* “ *cutem, ſed in ſubjectam quoque carnem* “ *impactus, qui e venis eo tandem confluxit. Quum enim venæ arteriæque* “ *maiores. immoderata ſanguinis copia* “ *diſtenduntur, tunc gravatæ in minores* “ *quaſi*

“ *quaſi onus deponunt, ex his demum in* “ *minimas. Ac tum per earum oſcula* “ *perque tunicarum meatus ſanguis cohiberi non potis effluit, illabiturque in ſpatia vacua, quæ inter fibras ſunt primorum corporum, præcipueque muſculorum, venarum, arteriarum, nervorum,* “ *atque membranarum. Hæ partes fluxione dum perfunduntur implenturque,* “ *diſtentæ copia quaſi divelluntur, ferventiſque, ſanguinis ardore incaleſcunt,* “ *doloremque faciunt. Sanguis quippe* “ *extra vaſa collectus, nec libere perflabilis, neceſſario putreſcit atque inflammatur.*” — *Vid. Fernel. de Ext. Corp. Affect. p.* 608.

HAD he ſaid, that, the veſſels of any particular part being obſtructed, by the conſequent effort of nature to open the ſluices, the blood is accumulated in the adjacent parts, and that this occaſions a diſtenſion of the veſſels, which muſt always be attended with pain, as the nervous coats will be on the ſtretch; nad therefore, a *fluxion* or *derivation* to that particular part will enſue: had he ſaid this, he would have been better underſtood.

ANOTHER ſays, that the velocity of the fluids being encreaſed, is the proximate cauſe of inflammations: I am rather of opinion, it is *the effect* of inflammation, and not the cauſe.

BOERHAAVE defines an inflammation thus. *Aph.* 371. "*Eſtque ſanguinis rubri* "*arterioſi in minimis canalibus ſtagnantis* "*preſſio et attritus a motu reliqui ſangui-* "*nis moti, et per febrem fortius acti.*" He is as much miſtaken as the laſt-mentioned writer; for the *momentum* of the blood being encreaſed from the irritation of the nervous coat of the veſſels, heat will naturally follow: therefore, this is as much the effect of obſtruction in the circulation, as in the former caſe.

INFLAMMATION, I am of opinion, is wholly owing to the fluids being detained in ſome of the veſſels intended for circulation. This may be brought about by different cauſes, and conſequently requires different methods of treatment. Suppoſe, for example, from a blow received on any part, or from a more general contuſion by a fall, ſome of the fluids extravaſated, the adjacent veſſels become obſtructed, and, as it will follow, in plethoric patients, a violent ſymptomatic fever enſue: in order, then, to give nature an opportunity of relieving herſelf of the load, bleeding, and emptying the bowels become immediately neceſſary: to abate the inflammation and pain, which is generally effected by a gentle diaphoreſis ſucceeding the evacuations, under particular circumſtances, ſudorifics, made with *opium*, become neceſſary, and the addition of volatiles, to attenuate the inſpiſſated blood, in ſome caſes, is of the greateſt utility: but here great judgment is neceſſary to determine, whether evacuations ſhould be made or not, previous to the adminiſtring ſudorific with volatile medicines. This, I think, we may lay down as a general rule, that the *primæ viæ* ſhould be immediately emptied; but the pulſe ſhould ever determine as to the *propriety* of bleeding: if low and languid, every practitioner would immediately declare it is not neceſſary. Tho' here again we may be deceived, if great attention is not paid to the manner of trying the action of the artery; for a languor in the circulation may be brought on, either by too much blood, or for want of the proper quantity to diſtend the veſſel, ſufficiently for its reaction on the contained fluid, in order to maintain the uniform and regular circulation, which is neceſſary to a ſtate of health. Now, if the veſſels are too full, the attempt to encreaſe the *momentum* of the blood by volatiles will not ſucceed, which may eaſily be illuſtrated by a very familiar obſervation, *viz.* If we take a phial, and fill it up to the cork, though we ſhake the bottle, the fluid remains immoveable; but, a ſmall quantity being taken out, it may eaſily be thrown into motion. The effect of ſtimulants and attenuants, therefore, will be loſt, unleſs room is firſt made in the veſſels; and, inſtead of a *diaphoreſis*, the heat, inflammation, and pain will be encreaſed; conſequently, in *plethorics*, bleeding muſt ever be premiſed.

WHERE the circulation is languid from *inanition*, volatiles, joined with anodyne perſpiratory medicines, (the patient being well ſupported by a nutritive diet) muſt be preferable to evacuations.

FROM what has been ſaid, it is extremely obvious, that an artery, overcharged with blood, is as incapable of producing a ſtrong full pulſe, for want of its contracting on the contained fluid, and getting rid of the additional quantity thrown into it by the *ſyſtole* of the *ventricle* of the heart, as for the want of a due quantity for its diſtention; for, proportionate to the influx into the vaſcular ſyſtem, will be the reaction of the coats on the contained fluid: therefore, in both caſes, a low and weak pulſe will appear to an inaccurate obſerver, and a patient may be loſt, or miſchief enſue, by not critically determining at firſt, whether the artery be over-charged or not.

In order to diſcover this, the pulſe muſt not be felt with one or two fingers on the carpal artery, for by equal preſſure on the veſſel we may be deceived; but, if three or four fingers cover a conſiderable length of artery, and we preſs hard for a time on it, and *then ſuddenly* raiſe all the fingers, but *that* neareſt to the patient's hand, the influx of the blood, if there be a *plethora*, will be ſo rapid, as to raiſe the other finger, and make us ſenſible of the fulneſs.

We will now ſuppoſe the inflammation to ariſe from *plethora*, ſome uſual excretion being ſuppreſſed: as, for inſtance, where the inſenſible perſpiration is obſtructed. This, we are told by *Sanctorius*, greatly exceeds what is carried off uſually by urine and *fæces*. If therefore, from cold, the pores ſhould be cloſed, and the perſpiratory matter being detained, the ſurcharge be immediately felt, and a fever enſue, the opening the pores again becomes the cure, and the ſame rule as that before given muſt be obſerved, to determine whether bleeding be neceſſary, in order to promote perſpiration. I cannot here omit taking notice of the vulgar error of not adminiſtering diaphoretics in proper ſeaſon. It is generally ſaid, I have got a violent cold, I will take ſpirit of hartſhorn, or the *ſpir. volat. aromat.* and ſome whey, when I go to bed, to make me ſweat; and we as often hear it ſaid, I did not ſweat, but was much heated, and burnt all night. This is accounted for by what has been already obſerved: the pores being obſtructed, the veſſels become over-charged, for want of the uſual excretion by the ſkin, and conſequently become incapable of increaſing the *momentum* of the blood, proportionably to the *ſtimulus* given by the volatile ſalts. Now, if inſtead of waiting, when they had ſtrong reaſon to think they had got cold, they had taken the volatile ſpirits, and diluted well with ſmall liquors on going to bed, before the pores had been long obſtructed, the *ſtimulus* of the volatile ſalts would have promoted perſpiration, and moſt probably prevented further miſchief.

To the doctrine laid down of obſtructions in the capillaries, by the component particles of the blood, I know ſome have objected, and have ſuppoſed ſpaſm on the veſſels, termed *erethiſm*, to be the *only* cauſe of inflammation. The effects of this depend on the ſenſibility of the parts affected, and the force of the *ſtimulus*, which acting on the nervous fibrils ſpent on the elaſtic coats of the blood veſſels, will produce a temporary obſtruction in the circulatory canals, and then the appearance on the part will be what we call *inflammation*. To illuſtrate this by a familiar fact, may probably more eaſily convince ſome than farther reaſoning. Do we not daily obſerve, that the ſting of a bee, gnat, and many other inſects, will often produce a violent inflammation of the part wounded. This cannot be owing to extravaſation, but evidently to ſpaſm, in conſequence of the irritation, by which a more than ordinary flux is derived to the part, the veſſels of which being thereby obſtructed, their diſtention is obvious to the naked eye. Though the conſequence of a ſting of this kind, in general, is looked on as trivial, yet we ſometimes obſerve, in ſome habits of body, that very ſerious effects have followed the ſting of a gnat, even the moſt violent *anthrax*, and that a ſymptomatic fever has enſued; for this fluxion to the parts increaſing the irritation of the nervous coats of the arteries and veins, the nervous fibrils terminating in the brain, will communicate that irritation, from whence will ariſe a more rapid circulation during the continuation of the *ſtimulus*, and the infarction of the veſſels, and in conſequence a ſymptomatic fever will be produced; when that is the caſe, the cure is generally obtained by *opium*, and not by repeated evacuations.

THERE are other inſtances, where *acrimonious juices* may produce this ſpaſm. Here neither evacuations, nor *opium*, will be of ſervice; but demulcents, bark, ſea-water, or other antiſcorbutics, are found to be moſt efficacious, by correcting the habit in general.

I HAVE now mentioned the different ſentiments of almoſt all writers, who treat on inflammation; but without eſpouſing the doctrine of any one, as aſſigning the *ſole cauſe* of it; for it may ariſe from derivation, producing a diſtention of the veſſels, a *ſtimulus* of their nervous coats, an increaſed velocity in the motion of the blood, and yet this derivation itſelf is owing to the obſtruction of the veſſels, from different cauſes.

To illuſtrate how compreſſion on the veſſels, cauſing obſtruction, may produce inflammation, we muſt recollect, that the intercoſtal veins, on the right ſide, empty themſelves immediately into the *vena azygos*, while thoſe on the left, in their courſe to that vein, paſs under the *Aorta*. If then a fever is brought on, from cold being taken, or a ſudden chill given to the body, when the blood has been violently heated by exerciſe, whether by drinking cold water at that time, or plunging into a river, or being expoſed to a cold wind, when the pores are open; a *pleuritis* may enſue; for the ſkin, not doing its uſual office, the *materia perſpirabilis* remains in the blood, the veſſels become over-charged, the natural heat of the blood is greatly encreaſed, a viſcidity enſues, and obſtruction is begun; and, for the generality, the left ſide is more frequently affected than the right in pleuriſies, for the above reaſons.

If obſtruction in the circulatory veſſels is denied, we cannot account for the appearance that generally precedes a *gangrene*; for the inflamed parts become extreamly red, ſwelled, and painful, before they terminate in a *ſphacelus*, and, whenever *that* is the caſe, how can we refuſe to acknowledge, that this ſhews a great tendency to *ſtagnation?* Yet this alſo lately has been denied; and, to ſupport that denial, it is aſſerted, that the component parts of the blood conſtantly preſerve their *equal* fluidity, that is, they never become inſpiſſated.

I ſhould think there would be great difficulty to maintain this doctrine, as daily experience evinces, that the blood, during phlebotomy, coagulating in the porringer, the globules, which flow from the vein on the ſurface of the blood, will run into each other, and form ſtill larger ſpheres, as globules of quickſilver do at coming into mutual contact; and, if the force of the heart and arteries, acting on the inſpiſſated fluid, is not ſufficient to give it a proper degree of fluidity, it muſt remain in its containing veſſels, and produce a *ſtagnation* and *obſtruction*, which cannot be removed, by the force of circulation, during this infarction of the veſſels: nevertheleſs, it is certain, that ſometimes, by giving room in the veſſels, attenuating the fluids, and encreaſing the *momentum* of the blood, in ſome ſpecies of inflammation, the patient has ſeemingly been cured of this complaint, which the moderns would have termed inflammatory. From the appearance of the blood running on the ſurface of the *coagulum* during phlebotomy, we might conclude it to conſiſt of globular particles; but experience ſhews, theſe globules contain particles that are angular and aculeated; for, when their cyſts are broken by beating them well with a ſtick in a baſon, their contents ſubſide, and the cyſts adhere to each other, and form what is called the fibrous part of the blood, which being taken away, the remainder will never after ſeparate into *craſſamentum* and *ſerum*, but continues a ſeemingly homogeneous fluid, denominated, perhaps too haſtily, a broken ſtate of the blood. This eaſy experiment ſhews, that theſe red particles, and the ſalts of the blood, are not globular, as the *ſpiculæ* of theſe ſalts, acting on the coats of the arteries, occaſion a briſker circulation, which, being continued, produces a fever. How can the effect of *cantharides* be otherwiſe accounted for? Nay, a fever has frequently been truly prognoſticated to be near at hand, when the blood has been robbed of its lymph by a vaſt profuſion of limpid urine, which had continued many days; for, in conſequence of this, the ſalts of the blood, through a defect of due proportion of their diluting vehicle, acting with too great acrimony on the coats of the veſſels, produced a preternatural rapidity in the circulation. What is the cure of a ſtrangury from bliſters but dilution? The irritation and the fever reciprocally encreaſe each other; that is, the greater the *ſtimulus*, the quicker the circulation; the briſker the circulation, the more ſalts; and the more ſalts, the greater the *ſtimulus*: and hence the erethiſm is kept up.

I SHOULD think the proximate cauſe of a dry ſkin is the cold air giving an univerſal check to perſpiration, when the pores have been dilated by encreaſed perſpiration from exerciſe, a hot room, &c. The matter, detained by the obſtruction of thoſe pores, may produce the erethiſm, and this the fever; and this appears probable, inaſmuch as the pores being again opened, and the perſpiration free, the univerſal ſpaſm goes off, the fever abates, and the urine, which during the fever was ſometimes very high coloured, at other times pale, without any *hypoſtaſis*, at the going off of the fever generally depoſites a thick ſediment.

THE ſuppreſſion of any natural excretion muſt unavoidably occaſion ſome diſorder in the animal oeconomy; but, probably, no one diſcharge can leſs be diſpenſed with than that performed by the ſkin: that this is evidently excrementitious, no one will deny.

WHENEVER this diſcharge is ſuppreſſed, the kidnies, or glands of the inteſtines, may prevent an immediate ill effect; yet we are ſure, that the *materia perſpirabilis*, remaining in the blood, muſt in time vitiate it, and give riſe to various diſorders, which, when we cannot find a better name for, we call *ſcorbutic*, and I muſt adopt it till I can fix on an epithet more proper.

PARTICULAR diet, bad air, want of exerciſe, and affections of the mind, may produce this change in the animal fluids. The effects are various, ſometimes falling on the *viſcera* of the different cavities, and diſtinguiſhed by names taken from the parts diſeaſed. At other times, we find nature making efforts to depurate the blood, by throwing the morbific matter on the ſurface of the body, either by a general eruption on the ſkin, or by boils or abſceſſes; and it is no uncommon thing to have the bones affected from the ſcurvy or ſcorbutic humour. In ſome, the internal ſubſtance of the bones is firſt attacked; in others, their external ſubſtance becomes carious, from the acrimony of the humours diſcharged from ſome phagedenic ulcer in its neighbourhood, which deſtroying the *perioſteum*, the bone ſoon is corroded to a depth proportionate to the cauſtic quality of the matter, and the length of time the blood remains in that ſtate. This vitiated ſtate of the blood frequently occaſioning the bones to be as ſoft and as pliable as ligaments, makes us change the term of art, from ſcorbutic to acrimonious, or ſharpneſs of humour, which, from experiments made on bones, we conclude is a powerful acid; and this not totally without reaſon, as we know, that the bones of any animal, being ſoaked for any length of time in an acid *menſtruum*, the cretaceous particles being wholly diſſolved, the membranous parts only remain, and they become quite pliable. Monſ. *Sue* gives a very remarkable caſe of a woman, the bones of whoſe legs and arms were ſo much ſoftened, that ſhe could permit her legs and thighs to be turned up towards her head, and her arms placed in any direction the perſon, who came to viſit her, thought proper. The reader will have this caſe related more at large in the chapter upon the Rickets. I myſelf have ſeen the ſame diſtemper of the bones, though in a leſs degree, in rickety children; and often the large cylindrical bones have become fractured, before the whole oſſeous ſubſtance was deſtroyed; but, as the conſtitution mended, a callous united the ends of the fracture, and the reſt of the bones recovered their uſual ſtability. Adults are alſo liable to fractures from a diſeaſed ſtate of their bones; for, from ſome kind of acrimony in their juices, the veſſels, in the internal part of the bones, are eroded, their contents extravaſated, and, ſtagnating, become ſtill more acrimonious. By the addition of freſh extravaſated fluid, the maſs ſoon reſembles that ſubſtance found in an *aneuriſmal ſac*, and loſes the appearance of grumous blood. When this extravaſation happens in the internal parts of bones, it will in time deſtroy their whole ſubſtance. Many of theſe caſes have happened within our memory, particularly in the late Archbiſhop of *Canterbury*, who fractured his thigh by only turning in bed; and, by the enquiries I have made concerning theſe caſes, I have always found them to have been the effect of what we call *ſcorbutic humour* in the ſkin retiring, which were followed by pains in the bones, ſuppoſed to be rheumatic.

It appears from the ſhocking accounts we have had of the cruel effects of the ſea ſcurvy in long voyages, that not only the conſtitution in general is affected by it, but that, from the acrid ſtate of the juices, like *aqua fortis*, it deſtroys every part, both fleſh and bone, with which the ſcorbutic humour is in contact. Bark, and elixir of vitriol, indeed, are employed as antiſeptics, while the patients are on board; which probably may, in ſome degree, abate the fury of this great enemy to ſea-faring people; yet we know, that the cure is effected by good air, and change of diet, medicine being but of little ſervice, and no farther aſſiſtance from ſurgery neceſſary, than to keep the ſores clean, when once theſe miſerable invalids are removed from their putrid cells, and put on ſhore, to breathe ſome wholeſome air.

THOUGH change of diet, good air and exerciſe, are neceſſary auxiliaries to obtain relief in ſcorbutic habits, yet, in general, medicine becomes a principal agent in the recovery of thoſe afflicted with what may be diſtinguiſhed by the name of the *land ſcurvy*, eſpecially when the lymphatic glands are affected, which ſwellings are termed *ſcrophulæ.* It has been obſerved, that mercurials, in ſuch caſes, by making the blood thinner, and more acrimonious, render the patients hectical; and when, in this ſtate, recourſe has been had to a decoction of the *ſarſaparilla*, and the *Peruvian bark*, theſe have often proved great reſtoratives, eſpecially if aſſiſted by aſſes or cows milk.

It is ſome years ſince I offered to the public my ſentiments on the powers of the *mercur. ſublimat. corroſ.* a faſhionable medicine at that time, and recommended as a ſpecific for venereal complaints. After the moſt candid trial, on a very great number of patients afflicted with the *lues venerea*, it appeared, that it had not a juſt preference to any other preparation of mercury that acted by its *ſpiculæ*, except by ſooner removing the blotches or eruptions on the ſkin; but it was by no means to be depended on in bad caſes. I likewiſe aſſerted, that the crude mercury, divided with hogs-lard, gradually introduced by the ſkin, had always proved the moſt effectual method of cure. From this account I may be ſuppoſed prejudiced againſt the corroſive ſublimate: far otherwiſe; for, by obſerving its remarkable effects on the ſkin of thoſe venereal patients who had taken it, I was induced, having frequent opportunities, to try its effects in ſcorbutic caſes, where the eruptions on the ſkin were the principal complaint. The recovery of ſome of theſe invalids was very rapid, but particularly ſo in that ſpecies of blotches, which we ſhould term *herpetic*. The doſes at firſt were ſmall, and generally diluted with the decoction of the *ſarſaparilla* root; and the *cort. Peruv.* was added as occaſion required. The *tinct. Thebaic.* was often neceſſary, to make it ſit eaſy on the ſtomach, and to prevent its griping in its paſſing through the inteſtines.

When the lymphatic glands, particularly thoſe about the neck, were affected, the *vinum antimoniale*, added to the ſolution of ſublimate mercury, generally made the medicine much more efficacious, and the doſe of the *vin. antim.* is to be encreaſed daily as the effects indicate.

It is almoſt univerſally believed, that the *Engliſh* in general have more or leſs of a ſcorbutic leven in their blood, and that no one diſorder has proved ſo obſtinate againſt the attacks of the moſt powerful medicines, as this. The man, who offers to the public a ſpecific for this diſorder, and obtains parochial teſtimonials of its virtues, and letters to himſelf of the moſt ſurpriſing cures effected, after the regulars had tried their utmoſt abilities ineffectually, can pen an advertiſement, and introduce the ſymptoms of almoſt every other diſorder, aſſerting, that they are equivocal, and properly belong to the ſcorbutic claſs; and, by his bold aſſertions, perſuades an invalid, who feels many of the complaints enumerated in the advertiſement, that he may certainly be cured, though the medicine, whoſe efficacy in theſe caſes is ſet forth as certain, is probably taken out of ſome old *Pharmacopœia* and diſguiſed, ought not to be cenſured, either as a fool, or his own enemy.

I BELIEVE, the profeſſors of phyſic and ſurgery were heartily tired, as well as their patients, in caſes of this kind, and I believe moſt ſincerely rejoiced at the revival of the practice of giving ſea-water, and bathing in the ſea, for ſcorbutic and ſcrophulous complaints; for, during ſuch ſeaſons, the one had the flattering appearances of health reſtored, and the others plumed themſelves on having given their advice.

I HOPE I ſhall not give offence by the word *flattering*; for, from bathing in the ſea, and a conſtant courſe of purging with ſea-water, the eruptions on the ſkin diſappeared, and the patients concluded themſelves cured; but the next ſpring generally convinced them of their miſtake: and, if that was not the caſe, you generally heard them complain of violent coughs, or pains in their bowels, which were attributed to cold taken, or ſome improper food, which had brought on thoſe colicks; but the fact is this, that the humour being ſuppreſſed by the cold ſea-water, and there not being ſtrength of conſtitution to throw out the diſorder on the ſurface of the body once more, they commonly die tabid. It is upwards of fifteen years ſince I was at *Harwich*, when a very ingenious gentleman there ſhewed me the bath that he had conſtructed for bathing in freſh ſea-water, let the weather be ever ſo bad. I acknowledged that they were extremely commodious; but intimated my apprehenſions, that ſea bathing in general had done much more miſchief than ever it had done good. He ſeemed rather angry at this; but, on my explaining myſelf to him by ſaying, that the cold ſea-water only repelled the humour, and the conſequences had often proved fatal; but that, in caſe he would find out a method of heating ſea-water to make warm baths, he would ſoon be convinced of the happy effects. He communicated my ſentiments to ſome of the principal phyſicians at that time, who approved of them; and the gentleman immediately ſet about the conſtruction of warm ſea-baths, as well general as partial; and I do acknowledge, that I feel myſelf happy in being the projector of theſe warm ſea baths, as I am not only convinced of their great benefit to mankind from my own experience, as well as that of others, but find that their utility is now ſo much eſtabliſhed, that there is not a place frequented for ſea-bathing, where it is not intended to erect proper baths, or ſubſtitute a bathing tub, till commodious rooms for the purpoſe of warm ſea bathing can be compleated. I do not ſay, that warm ſea baths are indiſcriminately to be made uſe of by all perſons afflicted with ſcorbutic complaints; for both ſkill and medicine are neceſſary in the conducting of patients through a courſe of ſea bathing; and frequently after a courſe of warm ſea bathing, the cold ſea-water is neceſſary to perfect the cure.

I HAVE thus ſtated this doctrine of different authors with reſpect to inflammation, ſome imputing it to a derivation of humour; others to an attrition of the ſolids and fluids, produced by an increaſed velocity of the blood; and others to ſpaſm or erethiſm detaining the blood in the capillaries. Theſe are each in ſome meaſure right, though I apprehend no one of them ſeparately ſhould be admitted as the ſole cauſe of inflammation. However this be, certain it is, that an interrupted circulation in the parts affected is the immediate conſequence; and, as this may ariſe from cauſes totally oppoſite, the treatment of it muſt be adapted to the cauſe.

I HAVE likewiſe ſaid, that the ſkin and integuments are the general ſeat of external inflammations; nevertheleſs, it is well known, that all the *viſcera* of the different cavities are equally liable to this diſorder, from the ſame cauſes, as was obſerved in treating of thoſe of the external parts, conſequently, what will be proper for the cure in one caſe, muſt be ſo in the others; but, the danger and difficulty of cure, may always be prognoſticated from the ſeat of the diſeaſe, the violence of the ſymptoms, and the habit of body. The gradual abatement of the ſymptoms is a favourable circumſtance; but, when they go off ſuddenly, the pulſe ſinks, the urine and *fæces* become fœtid, with colliquative ſweats, or the appearance of mortification on the external parts, they threaten miſchief of the worſt kind, and in general the loſs of the patient's life.

I WILL now ſum up the method of treating patients labouring under an inflammation. The *primæ viæ*, at all events, ſhould be emptied by mild cooling purges, and the body kept open by *clyſters*, when too many ſtools might be prejudicial. In *plethoric* habits, where the pain is violent, and the pulſe ſtrong, bleeding ſhould be repeated as occaſion may require. I am of opinion, where fulneſs is the cauſe of inflammation and fever, that evacuations cannot be too ſuddenly made. Dilution, with a cooling diet, is equally neceſſary, and every medicine of the *antiphlogiſtic* tribe ſhould at proper intervals be given; but, where *ſpaſm* is evidently the cauſe, the warm bath muſt be uſed, after previous evacuations have been made. Then, *anodyne diaphoretics* prove extreamly efficacious, and *volatiles* occaſionally added, have frequently the moſt happy effects; and, where the pulſe ſhews a *lentor*, dilution, and a proper diet, are not to be neglected, even where *ſpaſm* is the cauſe. Bliſters are frequently of the greateſt ſervice as attenuants, by being applied on the part loaded with inſpiſſated juices, and are not leſs efficacious in thinning the blood, when rendered viſcid or ſizy, from too great heat.

WHERE acrimony of the juices produces a partial *erethiſm*, as is often obſervable in ſcorbutic people, we frequently ſee a ſmall circle of inflammation, of a purple hue, about an ulcer, from which the diſcharge is extreamly thin. This kind of inflammation will never be cured by *evacuations*, *antiphlogiſtics*, *ſudorifics* with *opium*, or *volatiles*; but by demulcents, the *cortex Peruvianus*, the ſea-water, or ſome other antiſcorbutic health is to be reſtored to invalids from ſuch a dyſcraſy.

IT is well known, that inflammations are ſometimes diſperſed, the obſtructing particles being attenuated, and paſſing on in the uſual channels, the diſcolouration of the ſkin goes off, and the part that was inflamed recovers its former healthy appearance. To obtain this point has been my endeavour, by the method of treatment propoſed in the preceding pages; yet, when the diſeaſe is more violent in the attack, notwithſtanding our beſt endeavours to reſolve it, we are foiled, and matter will form, which is the next favourable manner in which an inflammation may terminate. The heat growing ſtill more violent, it will ſooner ſphacelate than form an abſceſs, as is evident in an *anthrax*; and thoſe, who are not converſant with caſes of this kind, ſuppoſing an indolence in the tumor, frequently recommend the *gum plaiſter*, by way of promoting ſuppuration, or ſome ſtimulating cataplaſms; and, with the ſame intention, they order the patient to live more freely: the natural conſequence of which is, that the blood being ſo highly inflamed, the enemy gains ground very rapidly by paſſages unſeen, and little ſuſpected by the ignorant, from the appearance of the external parts. The different effects of ſtimulants, according to the ſtate of inflammation of the blood, is alſo very obvious from the obſervations we make upon the application of bliſtering plaiſters, which, after proper evacuations, will only ſeparate the cuticle, like boiling water; but, where the blood is violently inflamed, they act more like a cauſtic, and produce a ſlough. Where inflammation will not go off by reſolution, nor end in ſuppuration, the next ſtate, we may conclude, will either be a *ſcirrhus*, or mortification.

CHAP. III.

ON TUMOURS.

IN the preceding pages, I have defined what is uſually termed a *tumour*, and ſhewn, that it is the effect of obſtructions in the vaſcular ſyſtem; and, according to the nature of the fluid that cauſed the infarction of the veſſels, it was claſſed under two general heads, as ariſing either from fluxion, which comprehended all of the inflammatory kind, or from congeſtion, which contains the indolent ſwellings.

THE method of treating an inflammation has already been explained, and ſo far we are advanced, as to the management of tumours ariſing from inflammation.

EVERY tumour has its beginning, its increaſe, its *acmè*, its declenſion, and its end or termination, which will be either when the obſtructed humour being attenuated, paſſes on in the courſe of circulation, or elſe when the ſtagnated fluid, by the inflammation of the adjacent parts, is converted into *pus*, and this by authors is termed *maturation*; or when, either from too great heat, or from too languid a circulation, a mortification comes on; or, laſtly, when the humours remain impacted in the tumour, and, being there condenſed, the diſeaſe degenerates into a *ſcirrhus*.

As we have obſerved, that the humour of ſwellings may be ſometimes returned into the maſs of blood by reſolution, or repellents, and that ſometimes abſceſſes are formed by the humour ripening into *pus*; it is neceſſary to conſider from what cauſes theſe tumours are produced, which will be our guide for the treatment of them. If, for example, there ſhould appear a little tumour on any part of the body, with ſome ſlight degree of pain, tenſion, and inflammation, and no preceding indiſpoſition, that may induce us to believe it to be the effort of nature, to get rid of ſome noxious matter that had cauſed a fever, and this the criſis, we ſhould *then* empty the veſſels by bleeding and *gentle* purges, and give *antiphlogiſtics*; diſcutient *foluſſes*, with a proper proportion of vinegar, cataplaſms made with *aq. ſaturnina*, or rags expreſſed from it, or elſe the *ceratum ſaturninum* ſpread on cloth, are proper as topical remedies. I have recommended purging in theſe caſes: but, obſerve, I ſaid *gentle* or *lenient*: for where inflammation is begun in any part, you are ſure to encreaſe it, if you make uſe of the more ſtimulating cathartics.

BUT ſuppoſe a malignant fever, or the ſmall-pox, has produced the appearance of an inflammatory tumour, our endeavours ſhould be, at all events, to bring it to ſuppuration, as the utmoſt danger would threaten our obſtructing nature in her deſign of reſtoring health by this critical abſceſs, and you may be aſſured, that the humour repelled from the ſurface of the body muſt be thrown on ſome of the *viſcera*, either of the *thorax* or *abdomen*, or poſſibly the depoſit may be made on the brain. The tranſlation of matter from one place to another is often very rapid, and the event generally fatal.* In order then to direct us in forwarding ſuppuration, we muſt have theſe two truths in view, *viz.* that if, from too languid a motion of the blood, there is too little heat, a *ſphacelus* will enſue; but, if the heat be too great, an *anthrax* will be the conſequence. In reſpect then, to evacuations, the pulſe is our beſt guide; but other attendant ſymptoms muſt likewiſe be conſidered. This will likewiſe direct the proper regimen. As for topics, there is but little alteration neceſſary: a ſoft cataplaſm of linſeed flour will in general be the beſt application, as it keeps its ſituation, and retains its heat better than the bread and milk poultice. If it ſhould be found to dry ſooner than you would wiſh, a little ointment of elder, hogs lard, or ſweet oil, will prevent that for the future. Where the obſtructed fluids require attenuation, there cannot, in my opinion, be any thing more efficacious, than the crude *ſal ammoniac* diſſolved in a decoction of the emollient herbs, &c. When a mortification is threatened, I know many people are fond of the ſtale-beer and oatmeal poultice, I ſuppoſe, as an antiſeptic, and, will add the *theriaca Londinenſis*

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* A perſon, about twenty years of age, complained of a violent ſwelling in his *left* thigh. A fluctuation of matter was very evident; but the ſkin was not thought ſufficiently thin at that time to let it out. A cataplaſm of *briony root* was ordered to be immediately applied. The next day, on taking off the poultice, the ſwelling of the thigh ſeemed totally ſubſided, and the patient was quite eaſy; but ſaid his *right* thigh was now ſwelled. On examining it, the matter was eaſily felt; and, though deep, was let out, and the patient ſoon recovered.

nenſis to it, by way of giving warmth to the parts; but then, the diſorder ceaſes to be treated as inflammation, and requires a different method of cure. Therefore, I ſhall omit ſaying any thing further on that head, till I treat of a *ſphacelus*. I muſt obſerve here again, that where a *phlegmon* may with ſafety be diſperſed, evacuations are not always the moſt effectual methods, as I have ſhewn before, that *ſpaſm*, or obſtructed perſpiration, will likewiſe give riſe to *inflammatory tumours*. Opiates, becoming ſudorifics, are in many inſtances found extreamly ſerviceable, eſpecially when the diſeaſe is owing to the above cauſes.

NOTWITHSTANDING our beſt endeavours to diſperſe an inflamed tumour, matter will often be formed, the ſigns of which are generally rigors, increaſe of fever, pain, pulſation, &c. the tumour at the ſame time growing ſofter, and very ſoon a fluctuation of the matter will be felt. The blood, or its conſtituent parts, being obſtructed, becomes from ſtagnation acrimonious, the capillary veſſels are corroded, and an extravaſation is the conſequence, which, by accumulation, in whatever part of the body it happens, produces an abſceſs. The *cellular* and *adipoſe* membrane, when empty, have been generally ſuppoſed to be one and the ſame; but they are certainly very different in their ſtructure and uſes: for the cells of the *membrana connectens*, or *celluloſa*, communicate, as is obvious; for, by introducing air by any one cell, the whole animal may be inflated, as may be obſerved when butchers blow up their veal. This *cellular* membrane likewiſe dips deep between the muſcles, fat, &c. nay, between fibre and fibre, and is the true connecting membrane of every part of the animal. This is likewiſe proved by the lymph extravaſated in an *anaſarca*; for, by the gravitation of the fluid, the legs become firſt ſwelled. Now were we to ſuppoſe, that the cells of the *membrana adipoſa* communicated with one another, the legs of fat perſons would be firſt increaſed in their ſize, before the ſigns of fulneſs would appear in any other part of the body; but then I am extreamly ſenſible, that there are *abſorbent* veſſels in each cell that take up the aqueous parts of the oily matter, depoſited in theſe cells, to give the fat its conſiſtency; and, I am clearly of opinion, that the fat is reaſſumed into the maſs of blood in any waſting of the body, either from being deprived of aliment, or in a *maraſmus*, by which, the irritation of the coats of the veſſels, from the ſalts of the blood is prevented; which ſalts, by their *ſtimulus*, would otherwiſe ſoon have hurried on death.

I MAY be ſingular in what I am going to advance, *viz.* that, in general,

neral, the *adipoſe* membrane is the ſeat of abſceſſes, eſpecially thoſe that are circumſcribed; for, from the ſtructure of the *cellular* membrane, whoſe cells communicate, the extravaſated fluids would diffuſe themſelves, and rather give an anaſarcous appearance, than that of a circumſcribed tumour, nor could it poſſibly be effected, unleſs we ſuppoſed, that the irritation of the extravaſated humour cauſed a *ſpaſm* or *erethiſm* on the capillaries, thereby producing a circumſcribed ſwelling; but the *membrana adipoſa* ſeems a much more proper *nidus* than the *membrana celluloſa*, for acrid particles eſcaped from the blood to form an abſceſs in, eſpecially when we conſider, that nothing has a greater tendency to putrifaction than oil grown rancid, and, conſequently, the extravaſated humour will ſooner be converted into *pus*, when lodged in the *adipoſe*, than in the *cellular* membrane. This fact may often be obſerved in the large abſceſſes formed on the buttocks, from long confinement in bed, when a depoſit is made on thoſe parts after fevers: therefore, both reaſon and experience ſeem to favour this hypotheſis, if ſuch it ſhould yet be thought.

I HOPE I am underſtood, that I ſuppoſe, what is generally defined a *phlegmon*, or critical abſceſs, in which a large quantity of matter is collected, to be formed in the *membrana adipoſa*; nevertheleſs I am extreamly ſenſible, that the *cellular* or connecting membrane is frequently the ſeat of miſchief, as the receptacle of ſome extravaſated humour, where the fluids in general have a tendency to ſphacelation; and, under ſuch circumſtances, it is well known, that the humour, inſtead of being collected, and forming an abſceſs, will be diffuſed proportionate to the quantity extravaſated, and form ſloughs throughout a whole limb, and where, probably, the external appearance of ſphacelation ſhall not at firſt exceed the ſize of a crown piece, the mortification will then diſcover itſelf ſoon after, at a ſmall diſtance, and we ſhall find, in the end, that it has not only crept under the ſkin, but has burrowed deep between the muſcles, and, through ſome of theſe ſphacelated parts, ſloughs of an immenſe length are frequently drawn out, which prove to be the *cellular* membrane; in which caſe, if the patient does not ſink under the diſcharge, the neighbouring parts muſt, on healing, unavoidably unite, and conſequently the limb be abridged of its motion, as far as the free motion of the muſcles, one over the other, is hindered by this union. This attachment is obvious to any one, where the *cellular* membrane has been deſtroyed by the pea in iſſues of long ſtanding.

I DARE not venture to gueſs at the cauſe of diſeaſes of the ſkin and ſurface of the body, ariſing, as it is ſaid, from the indiſpoſition of the conſtituent particles of the blood. But this we all know, that the greateſt degree of heat does not produce a *phlegmon*, but a carbuncle; and we know likewiſe, that ſometimes, by abating that heat, matter will be formed, and that ſometimes, to produce that effect, we are obliged to encreaſe the animal heat.

It is no leſs true, that, from falſe principles early inculcated, we not only become prejudiced in their favour, but it is with the greateſt difficulty we can be prevailed on to part with them, in favour of the experience of others: and I may add, that many people have loſt their lives from the miſmanagement of an *anthrax*, owing to the doctrine handed down to us in the writings of our forefathers, *viz.* "that it is owing to a malignity in the blood and humours, which poiſon ought to be expelled by cordials of the warmeſt kind, in the ſame manner as they treated peſtilential fevers."

fevers." And I am perſuaded, that, in general, where that method is purſued, in caſe of an *anthrax*, the miſchief will be increaſed, and carried on by ſubcutaneous channels in the cellular membrane, the ſloughs farther extended, and very little matter produced; whereas, were we to abate the inflammation by proper evacuations of bleeding, opening medicines, and antiphlogiſtic remedies, and at the ſame time apply cataplaſms and fomentations, in which vinegar ſhould be at leaſt the fourth part of the liquor, when ſtrained from the ingredients; probably the *ſphacelus* might ſtop, and matter be formed, which, in this caſe, is extreamly thin, and ſo much in quantity, as to endanger the patient's ſinking under the diſcharge, if not reſtrained by the *cortex* and cordials, as occaſion may require. By theſe the patient is ſupported at this period of the diſeaſe, the ſlough aſſiſted in its ſeparation, and, by proper application, the wound incarns and cicatrizes.

I KNOW there are many people much prejudiced in favour of *ſuppurating plaiſters*, as they are termed, which are formed of the warm ſtimulating gums. This may be depended on, that, whenever the blood is highly inflamed, the tumour, though ſeemingly a *phlegmon*, will, by ſuch application, become more inflamed and extended; and more probably end in an *anthrax* than in a mild ſuppuration.

SUPPOSE that the pain, pulſation, heat, and redneſs of the ſkin, are greatly abated, if not totally gone off, the tumour enlarged, the ſkin thin, and the fluctuation of the matter evidently felt; the diſcharge of that becomes abſolutely neceſſary, and is effected either by cauſtic or inciſion. The alternative to many practitioners ſeems of little moment; but I muſt beg leave to diſſent from them in this matter, as the different circumſtances, in different caſes, muſt determine which way of opening is to be preferred.

In ſome abſceſſes, where there is but little hardneſs in the area of the tumour, and the ſkin not rendered ſo thin as to riſque its becoming a ſlough, if left on, the making an inciſion the whole length of the ſwelling, in ſuch direction that there may be a dependent drain, will often be ſufficient; but, in caſe the veſſels of the ſkin are totally deprived of their reſtitutive power, it is generally neceſſary to remove the thin ſkin nearly to the extent of the matter in the abſceſs; but, in caſe there is but a ſmall portion of the ſkin rendered thin, while the remainder of the circumference is very hard, it will be proper, as ſoon as the matter is let out, to divide the thick lips with a knife by a crucial inciſion, to the full extent of the tumour each way, and at firſt to keep them ſeparated by dry lint; then to foment at each dreſſing, and apply a proper digeſtive to the lips of the wound, to rub in ſome emollient ointment with mercury into the indurated parts, and to lay a linſeed flour poultice over the whole, as every method ſhould be made uſe of to empty the thickened lips of the wound as quickly as poſſible, otherwiſe they will grow callous, and require removing at laſt.

CAUSTICS have their uſe and inconveniency, and therefore the ſkill of the ſurgeon muſt determine their propriety in practice. As for example: in large abſceſſes we cannot apply them to the whole extent of the tumour, and in very ſmall ones they deſtroy more of the ſkin than we would wiſh, and while the ſkin is any ways inflamed, they almoſt always produce moſt excruciating pain, till they arrive at the matter; but, in all indolent tumours, or even in venereal buboes that do not maturate kindly, a large cauſtic does more as a ſuppurant, than any poultice or plaiſter I ever ſaw uſed; but then, I do not let out the matter, but apply a linſeed flour cataplaſm, with ſome of the digeſtive ointment mixed with it, till the eſchar is ſeparated: it then becoming an ulcer, muſt be treated according to the circumſtances of the caſe.

It may be laid down as a general rule in all operations of ſurgery, to ſave as much of the *ſound* ſkin as poſſible, and not to leave any part of that which is *diſeaſed*; in extirpating tumours, whether cancerous, ſcrophulous, &c. it frequently indeed becomes a matter of neceſſity to ſave the ſkin and other integuments; for thoſe, which ſometimes are ſituated under the maſtoeid muſcle, put on the appearance of two tumours, (by the preſſure of the belly of the muſcle) the one anterior between the *trachæa* and implantation of the tendons of the maſtoeid muſcle into the upper part of the *ſternon*; the other poſterior a few inches below the maſtoeid proceſs of the temporal bone. Whenever this is the caſe, the poſterior part of the tumour ſhould be punctured at its upper part with a lancet firſt; then let your aſſiſtant lay a finger on the orifice, to ſtop the effuſion of the contained fluid from this orifice, and at the ſame time preſs the matter towards the *ſternon*. You then make a ſecond inciſion with a lancet, about an inch long, into the anterior part of the tumour, ſo as to avoid wounding the tendon of the maſtoeid muſcle. The poſterior opening may then be dilated, ſufficiently to paſs a piece of fine holland under the muſcle, in the manner of a ſeton, which muſt be moved conſtantly every day, and dreſſed properly, ſo as to deſtroy the cyſt, before the openings are permitted to heal. The ſame advantage is daily found by a ſimilar manner of opening thoſe collections of fluid below the *patella*, which are often produced in women, as I am told, by their ſcouring rooms on their knees. A longitudinal inciſion, made on each ſide of the tumour, will ſave a large portion of ſkin, and is far preferable to the practice of removing all the ſkin that covers the tumour, not only on account of ſhortening the cure, by ſaving ſo much ſkin, but likewiſe by avoiding the hazard of miſchief, by expoſing the ligament of the *patella*.

CHAP. IV.

OF THE ERYSIPELAS.

THIS diſorder, by ſome authors, is alſo called *ignis ſacer*, and by the vulgar St. *Anthony*'s Fire: others, more judiciouſly, make two ſpecies; the milder or ſuperficial they name *eryſipelas*; the more malign, eruptive, and eroding, they term *ignis ſacer*.

An *eryſipelas* is always claſſed amongſt inflammatory diſorders, and may be defined, a complaint any where on the ſurface of the body, attended with great heat, ſometimes a pungent pain, but not always; the ſkin appears florid, with rather a ſtronger tint than what we diſtinguiſh by the word *bluſh*, inclining to a yellowiſh hue, particularly obſervable when the inflamed part is preſſed upon by the fingers, and before the blood returns again into the cutaneous veſſels. The part effected is generally ſwelled, tho' not much elevated and circumſcribed, as in a *phlegmon*, but chiefly confined to the integuments, and frequently a whole limb is affected. The ſkin has generally a ſhining appearance, though not from violent tenſion, and is without pulſation or throbbing. From a very ſmall beginning, this complaint will ſuddenly ſpread itſelf to a very conſiderable extent on the ſurface of the body. It is often attended with violent itching, the conſequence of biliary particles obſtructing the cutaneous veſſels, and always with ſome degree of fever. This ſpecies of *eryſipelas* is termed *ſimplex*, to diſtinguiſh it from the *ignis ſacer*, which is attended with veſications, puſtules, and ſometimes with little ulcers. How far the redundancy of bile in the blood, during this ſtate of inflammation in any part, may confine it to the ſkin, I will not attempt to determine; but, though the blood, on preſſure with the fingers on the inflamed part, immediately retires, and ſoon returns, nevertheleſs, in that ſhort interval, we obſerve the ſkin has not its uſual whiteneſs, and the veſicles that attend this diſeaſe are always full of a yellowiſh *ſerum.*

THE general method of treating the *eryſipelas*, if local, is to abate the inflammation by bleeding, cooling purges, nitroſe medicines, and wholly purſuing an antiphlogiſtic plan; but, previous to this determination, the cauſe of the diſorder ſhould be enquired into, and the ſtate of the pulſe examined: for, in caſe it is *critical*, the *eryſipelas* ſhould no more be repelled, than a *phlegmon*, in conſequence of a violent fever; for, ſometimes, matter will be formed, or ſloughs made in the cellular membrane, though it does not come under our definition of a *phlegmon*, nor can it with propriety be termed a *gangrene.*

I HAVE frequently ſeen patients attacked with a ſort of *eryſipelas*, which almoſt always began in the forehead, and generally the firſt ſign of ſwelling with inflammation was between the eyes, on the upper part of the noſe. It was accompanied with itching, redneſs, and ſome pain, a low pulſe, vomitings, and violent head-ache, the face ſoon became bloated. In thoſe that recovered, the ſwelling kept up for a week, and, on its going off, left cruſts like thoſe from a bad kind of ſmall-pox. I muſt remark, that, from the firſt appearance of this diſorder, it was termed *eryſipelas*, and was in conſequence treated as ſuch, by bleeding, purging, and cooling medicines, for the moſt part with very bad ſucceſs. On remarking, that, under this practice, the face generally ſubſided, and the patient died, it was thought neceſſary to change the plan of treatment. Thoſe I ſaw afterwards were ſupported by cordials and the *bark*, and bliſters were applied as they became neceſſary. If ſtools were wanted, clyſters were preferred to aperitives given by the mouth. By this method, moſt of thoſe who were attacked by this diſorder recovered.

THIS diſeaſe was epidemic for two years, I cannot ſay contagious, as not above two or three out of thirty, who lay in the ſame wards in the hoſpital, were ſeized with it. I ſaw ſeveral private patients at the ſame ſeaſon of the year, who were attacked with this ſpecies of *eryſipelas*.

WHEN, in conſequence of a blow, the head ſwells, and the face becomes bloated, not immediately, but perhaps three weeks, more or leſs, after the hurt, it prognoſticates danger. Thoſe who recover generally have ſloughs of the whole imbanding membrane of the muſcles of the ſcalp come away by the different openings, that are neceſſarily made for the diſcharge of matter collected. This is alſo termed an *eryſipelas* by ſurgeons.

THE moſt violent *eryſipelas* on the head and face I ever ſaw was in a man about fifty years of age, the hiſtory of which is as follows.

THE *antrum Highmorianum*, or *ſinus maxillaris*, is ſufficiently known; therefore any deſcription of its ſituation, &c. I conclude is unneceſſary to every profeſſor of ſurgery. This cavity is lined with a vaſcular membrane, and, in general, we obſerve an aperture from it into the noſe: ſometimes, indeed, this opening is wanting. This membrane, either from cold taken, the fangs of a tooth irritating it, or from external injury, frequently becomes inflamed, and, matter forming is detained in the *antrum*, ſuppoſing the cavity imperforate, the acrimony of the matter will in time make its way through the bone whereever it happens to be thinneſt; and, though there may be the uſual communication with the noſe, yet, when we are in an erect ſituation, the bottom of the cavity muſt always be lower than the orifice into the noſe, and the effect of the acrid matter muſt be the ſame, though it be longer in making its way through the bone, as ſome of it will always be emptied into the cavity of the noſe, when we lie down in bed, on the oppoſite ſide, and poſſibly unnoticed by the patient, as the matter, from the ſituation of the head, poſſibly may paſs down the *oeſophagus* into the ſtomach. In this caſe, the patient oftentimes complains of a very offenſive ſtench on waking, and ſometimes of a ſickneſs at his ſtomach. The cavity of the maxillary bone conſequently being in a manner emptied every night, there is an abatement of pain in the teeth and face for ſome hours in the day; from which account given by the patient, it has frequently been miſtaken for a ſymptom of an intermitting fever, which is no uncommon caſe, and, where it proves really to be ſo, the *bark* is almoſt always a ſpecific; but, in the above-mentioned abſceſs, the only abſolute cure muſt be the diſcharge of the matter from a depending opening, which is generally effected by extracting the laſt but one or two of the *dentes molares* on the diſeaſed ſide. Should the *alveoli* happen to be imperforate, and not communicate with the *ſinus maxillaris*, an opening into it muſt be made by a proper inſtrument, that the matter may have a free exit by this perforation.

A. B. having taken cold by being wet from rain, and not ſhifting his cloaths till dried on his back, was ſeized with a violent fever, and great pain on the left ſide of his face, and particularly in his teeth, on the ſame ſide, as he deſcribed it. He underwent various evacuations to no purpoſe. At length, his face and head became extreamly ſwelled, and had all the appearance of *eryſipelas* conſequent of the external membranes of the *cranium* having been contuſed. This greatly alarmed the family in which he lived, and I was deſired, with the gentleman, who attended him, to viſit him. The above circumſtances were related to me, and the caſe was concluded to be a critical abſceſs from the preceding fever. The pain was ſo violent, that he could not get any reſt day nor night, even though opiates, cataplaſms, and fomentations, had been made uſe of for ſome time. At length, matter was felt above the left ear, but evidently confined by the *faſcia*, that binds down the *crotaphite*, and other muſcles of the ſcalp; though the whole head ſoon after felt pappy under the ſkin. The matter was let out firſt by an opening above the left ear: more matter ſoon after was diſcovered a little above and behind the right ear, which was likewiſe diſcharged by the lancet. A third collection was perceived, after ſome time, at the lower part of the occipital bone, near to the nape of the neck. This was a favourable opportunity to make a depending aperture, which communicating with thoſe nigh the ears, the matter was twice in the day waſhed away by an injection, which in a few days brought away large membranous ſloughs; but, before the ſcalp collapſed, and united to the ſubjacent parts, ſome of the matter ſeemed to have inſinuated itſelf behind the *maſſeter* muſcle, as an abſceſs was forming on the left ſide, below the articulation of the *mandibule*. When the teguments were become ſufficiently thin, the matter was let out; and, on examining the cavity of the abſceſs, the probe was obſerved to paſs into the *ſinus maxillaris*: the bone and cavity were both extremely carious, and diſcovered what was the original cauſe of complaint. As the man was at that time eaſy, and the diſcharge gradually leſſening, the *dentes molares* were not drawn, as it was pretty evident, that the teeth and their *alveoli*, would ſoon come away with the carious part of the ſuperior maxillary bone, which at length happened, and the patient was perfectly reſtored to health, to which the bark was greatly contributory.

I HAVE obſerved, that whenever matter is collected in the *antrum*, the thinneſt part of its *parietes* will become the aperture. This opening has been ſometimes into the orbit of the eye, and occaſioned the globe to be protruded. Sometimes the matter has made its way out below the edge of the orbit, and the *fungus*, ariſing from the *caries*, has frequently occaſioned the diſeaſe to be miſtaken for a cancer. After proper enquiries, if, in either caſe, it ſhould appear, that the collection within the maxillary bone gave riſe to the preſent appearances, by extracting one of the *dentes molares*, as I have related, making a depending drain from the cavity, and ſyringing it with ſome decoction of bark and tincture of myrrh, or brandy and water, every thing will ſoon put on a favourable appearance, and the cure will ſoon be effected.

If the excretory duct of the parotid gland, by any accident, ſhould be divided, the *ſaliva* will conſtantly ooze out in great quantities; and it is not uncommon, after ſome time, to have a *fungus*, with hardneſs produced about the wound. This appearance has likewiſe been miſtaken for a cancer, and particularly if it became obſtinate, and would not give way to the dreſſings uſually applied to other ſores.

From the cauſe of theſe ſymptoms, it will be plain to thoſe, who are converſant in ſurgery, that, by making a perforation through the cheek, where the duct was wounded, and by paſſing through the inciſion a ſkein of ſilk or thread, by way of ſeton, obſerving to remove by the lancet the edges of the wound, ſhould they be callous, the *ſaliva* will ſoon find its way into the mouth, by the direction of the ſeton; for, as the external opening may be ſtopped with dry lint, it conſequently paſſes where there is the leaſt reſiſtance, and the ſeton being withdrawn, at the proper time, the wound cloſes in a few days.

CHAP. V.

ON THE ANTHRAX.

THERE are very few authors, who have wrote on the plague or malignant fevers, but have mentioned the peſtilential bubo, and *anthrax*, or carbuncle, as an attendant on thoſe ravaging diſorders, without which the patient generally dies in a few days. From this obſervation, the phyſicians immediately concluded theſe tumours to be the efforts of nature to get rid of ſome noxious particles, by throwing them on the ſurface of the body, which particles, being obſtructed, accumulate and form a tumour; and, to ſecond her in her endeavours, they generally gave the warmeſt cordial medicines, ſuch as the *theriaca*, ardent ſpirits, &c. as antiſeptics and alexipharmacs, at the ſame time forbidding all kinds of evacuations, either by bleeding or purging, as likely to bring on certain death, concluding, the tumour would thereby be prevented from maturating, on which the recovery of the patient depended; yet they candidly acknowledge, that ſometimes theſe tumours did not produce matter, but remained hard for weeks, though all the aſſiſtance of cordials had been freely made uſe of, and great attention paid to the maturation of the tumour, by applying the warmeſt kind of ſuppurating cataplaſms, gum plaiſters, cupping glaſſes, bliſters, &c. alſo deep ſcarifications were frequently made into theſe indurated ſwellings. Others again, on the ſame ſuppoſition, *viz.* that the diſeaſe was depoſited in theſe buboes or carbuncles, extirpated them. The former method having generally been found inefficacious, and the laſt fatal, ſome have made uſe of the actual cautery, with the ſame ſucceſs; and thoſe of a more humane and tender diſpoſition have given preference to applications potentially cauſtic on the carbuncle, inſtead of a red-hot iron.

The *anthrax*, or carbuncle, is generally defined an highly inflammatory tumour, the effect of peſtilential particles lodged in the blood, which, being thrown on any part of the body, form a tumour, which becomes extreamly hard.

The cauſe in general is ſaid to be a bad conſtitution of the air producing epidemical complaints; and a habit of body extreamly bad, from the vitiated ſtate of the circulating fluids, which producing a fever of the moſt malignant or putrid kind, muſt always be attended with the utmoſt danger. As this diſorder is not unfrequent, and has of late years proved fatal to many, I ſhall be happy, if any remarks I have made can be of uſe to the public, when farther conſidered by the profeſſors of phyſic and ſurgery.

The diſeaſe may be divided into two kinds: the peſtilential, and that which is not ſo. It has been our happineſs, that in *England* there have been no opportunities, ſince the year 1665 and

1666, of making obſervations on the firſt ſpecies of this diſtemper. What I have here to ſay muſt be underſtood to relate to the ſecond, of which there are two kinds, namely, that which proceeds from a great quantity of blood highly inflamed, and that which is the effect of a putrid and malignant fever.

THE firſt complaint a patient makes in this caſe is generally great heat, and violent pain in ſome part of the body. On a ſuperficial examination, there ſeems to be only a large pimple, attended with violent itching; but, on a more careful examination with the fingers, a circumſcribed tumour, ſituated extreamly deep, and very hard, is eaſily diſcovered; it ſoon becomes of a dark red or purple complexion about the center, and of a paler red in the circumference of the tumour, as it extends towards the ſound ſkin. On the *apex* of the pimple, a little veſicle or puſtule is obſervable. To relieve the intolerable itching, the patient frequently ſcratches the part with violence, which breaks the pimple, from which, inſtead of *pus*, a *ſanies*, or brown thin liquor is diſcharged, and an eſchar is diſcovered. Sometimes a great number of theſe pimples are produced on the ſurface of the tumour, by ſcratching. Great weight and ſtiffneſs of the adjacent parts are likewiſe conſtant attendant ſymptoms, where there is any degree of a putrid fever, that gives riſe to this kind of tumour. The patient is extreamly reſtleſs, to relieve which he is generally on his legs. The complexion is pale, the tongue ſometimes is white, and at other times of a deep red colour, but moiſt; the pulſe weak and low; the urine ſometimes is very pale, and much in quantity, at other times is turbid; often the patient complains much of his head, either from pain or giddineſs; ſometimes is drowſy, at other times cannot get the leaſt ſleep; ſometimes he is delirious; frequent chillneſs or rigours, profuſe ſweats, ſometimes warm, at other times of the colliquative kind, attend this caſe. The patient ſometimes is coſtive, then again has a profuſion of ſtools; he generally complains of loſs of appetite, nauſea, and vomiting; takes but little nouriſhment, complains of difficulty in breathing, and is extreamly low, with palpitation of the heart, and ſometimes faints away. The appearance of a ſmall black ſlough in the middle part of the tumour is not unuſual; but, if we were to entertain the idea, that is given us by the ancient writers, of this complaint, that the part affected is burnt to a cruſt or cinder, like a coal, we ſhall find ourſelves greatly miſtaken; for ſhould the tumour be extirpated, as has been done by ſome, by way of removing the whole complaint, the eſchar indeed would appear black, and the tumour taken out would be hard; but, whenever the patient does well, it is by curing the fever, and producing matter. This point obtained, we generally find the cellular membrane ſloughed for a conſiderable way under the *membrana adipoſa*, and the reſt of the external integuments; but then it does not appear hard, but like a ſoft ſpungy ſlough full of matter, which will often come away, of a very conſiderable length, through a very ſmall opening. But we muſt here remark, that the healthy ſtate of the integuments by no means marks the extent of the *anthrax*; for it is a *ſphacelus* of the *membrana celluloſa*, which I have endeavoured to diſtinguiſh from the *membrana adipoſa*, when void of fat. Therefore, in this caſe, the *ſphacelus* may deſtroy great part of the cellular membrane, without any apparent injury done to the external integuments. If attention is paid to the ſkin in this caſe, we ſhall frequently find ſome miliary eruptions about the clavicles, the breaſt, or other parts of the body; and, towards the latter end of the diſorder, a different crop of large pimples will be thrown out, like the ſmall-pox, which will maturate; though ſometimes indeed, even ſome of theſe become carbuncles. This ſpecies of *anthrax* may be termed, with great propriety, *malignant*.

But, where high living, a ſedentary life, inſpiſſated lymph, and *plethora*, are the combining cauſes to produce a tumour of this kind, it may not improperly be called the *non-malignant carbuncle*; and the method of treatment, in theſe two caſes, muſt be in the firſt attack extreamly different; in both, miſchief advances by haſty ſtrides, working very often, as the military gentlemen ſay, *by ſap: carbo enim putreſcendo ſerpit.*

When we are aſſured of any tumour's being of the carbuncle kind, if we are called to the patient as ſoon as it appears, and the pulſe is full, we cannot err in taking away ſome blood; nor are we to be deterred from doing it, though the pulſe be languid and low, till we are convinced, that this is owing either to inanition, or a vitiated ſtate of the circulating fluids; for an oppreſſed pulſe will, without the greateſt attention, frequently miſlead us. The *primæ viæ* ſhould be duely emptied, and then, if a putrid or malignant fever is the cauſe, antiſeptics, cordials or volatiles, muſt be joined to the *cortex Peruvianus*, as medical knowledge may determine.

The *non-malignant carbuncle* requires much larger and more repeated evacuations, as well as a general antiphlogiſtic regimen; but, when matter is once produced, and the tumour in general becomes ſoft *, ſoon after it is opened, it will diſcharge a very large quantity of thin acrimonious *ichor*, owing to the *flocculent* ſlough not being totally diſengaged from the ſound parts. At this period of the diſorder, the bark is almoſt always a ſpecific; and, if the patient is rendered low from pain, as well as the profuſe diſcharge, cordials, at this period of the diſorder, joined with the bark, are as neceſſary for the ſupport of the patient, as in the *anthrax* of the malignant kind. In both ſpecies, acids have their uſe. Cataplaſms, of the lenient and emollient kind, are moſt proper till the tumour is opened: after which, whether the uſual digeſtive ointments, as far as they can be brought in contact with the ſides of the abſceſs, or deterſive antiſeptic injections, made with the *cortex Peruvianus*, *tinct. myrrh.* &c. or thoſe of the vitriolic kind, ſhould have the preference as topical remedies, I cannot abſolutely determine, tho' I have uſed them to different abſceſſes of this kind in the ſame ſubject. The injections ſeemed to me to be rather more ſerviceable, by leſſening the diſcharge, the ſloughs came away nearly in a ſpace of time proportionate to the ſize of the ſloughs to be thrown off; but, where a *faſcia* or tendon is denudated, it may be laid down as a rule, never to be deviated from, to diſcontinue all greaſy applications, as by them the gleet will encreaſe, and the ſloughs be extended; but, when the ſloughs are once ſeparated, vitriolic injections, ſuch as *Bates's aq. camphorat.* made tepid, or any of the *deſiccants*, will be of more ſervice, than any other kind of dreſſing, as the ragged pieces of membrane will be waſhed off, the matter become thick, by the mouths of the ſeparated veſſels being gradually conſtringed, and granulations produced. After the hollow places, from whence the ſloughs have been diſcharged, are ſufficiently deterged, (as will appear from the ſtate of the matter) compreſs and bandage, where it can be conveniently applied, will ſhorten the cure conſiderably, as the ſides of the cavity will often unite in forty-eight hours. I would wiſh ſtrongly to inculcate the neceſſity, at a proper time, of making an opening ſufficient to draw out the ſloughs; for, in caſe you rely on that opening, which is generally made by nature, the thin matter only will be diſcharged, and the ſloughed or *flocculent* membranes will remain, and the orifice cloſe up. When this is the caſe, how greatly detrimental in preſent, as well as troubleſome in future, it may prove to the patient, every practitioner in ſurgery can declare; but, in caſe it ſhould be thought proper to dilate the cavity, in which the ſlough was contained throughout its whole extent, it muſt be treated as a common abſceſs.

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* Though *Fabricius ab Aquapendente*, in his Surgery, as well as *Wiſeman*, makes a proper diſtinction between the peſtilential and non-peſtilential carbuncle; yet the latter declares, page 53, fol. edition, that a carbuncle never ſuppurates. However, experience tells us otherwiſe.

It is well known, that whenever any part has had the *leaſt tendency* to mortification, the bark has, of late years, been indiſcriminately given in very large quantities, as the *only* ſpecific to ſtop its progreſs; and ſo ſanguine are many in this prejudice, that they do not believe any miſchief can poſſibly enſue from the uſe of this medicine. This partiality is very excuſable, as there can be no doubt, but that the high opinion they entertain of it in ſuch caſes, muſt be founded on experience, as probably ſome very extraordinary and unexpected cures have been performed, where the bark was the chief remedy employed; and I frankly acknowledge, I have ſuſpected myſelf of being too much under a ſimilar prejudice in favour of NITRE, where an inflammation runs very high; as I have been ſo often witneſs of its happy effects in ſtopping the progreſs of an *anthrax*, and producing matter like that of a common abſceſs: nevertheleſs, I muſt not omit acquainting my readers, that all proper evacuations were likewiſe made, according to the ſtrength of the patient, as occaſion indicated; and I have candour enough to add, that I believe, when things were brought *to this point*, and the diſcharge was extreamly thin, and greatly too much in quantity, that, had I not given the bark *freely*, I ſhould have loſt my patients; but, under ſuch circumſtances, they muſt be blind indeed, who will not acknowledge its ſuperior efficacy to any other medicine known to us at this time.

The *cortex Peruvianus* may not be improper in many inſtances, where there is only a *tendency to ſphacelate*; and after a confirmed *ſphacelus*, when the patient, by the neceſſary evacuations made to prevent an encreaſe of inflammation, has been conſiderably reduced, the blood greatly attenuated, the mortification ſeemingly ſtopped, the diſeaſed parts begin to ſeparate, and a thin diſcharge, and great in quantity, follows; in theſe circumſtances, the bark itſelf ſhould be given as frequently as the ſtomach will bear it, in ſuch form as will beſt agree with the conſtitution. *Mynſickt*'s elixir of vitriol, two or three times in the day, will alſo generally be neceſſary, either with water, or in a decoction of the bark; and I may venture to aſſert, in ſuch caſes, will always be found ſerviceable, if nothing forbids its continuation.

In old ulcers alſo, where the inflammation ſeems circumſcribed at the diſtance of an inch round the ſore, the ſurface of the ulcers looks gloſſy, and the diſcharge is extreamly thin, and very offenſive, with little or no ſleep, from the violence of the pain, the bark is no leſs a ſpecific, and the addition of *opium*, as circumſtances may require, often will be found neceſſary.

From this obſervation, it may appear reaſonable to believe, that the reputation, which the bark has deſervedly acquired in gun-ſhot wounds, has been principally owing to its incraſſating quality, though given as an antiſeptic; for, when copious evacuations were neceſſary to prevent a mortification, from a *plethora*, or exceſs of inflammation, without doubt, the impoveriſhed ſtate of the blood would require a reſtringent and reſtorative; and, without theſe evacuations, the bark would certainly have been hurtful.

In old people, or in thoſe whoſe circulation is naturally languid, we frequently obſerve, in mortifications, that, though the black ſlough of the ulcer does not ſpread, and the mortification is ſeemingly ſtopped, yet, even where the bark has been given, and as frequently as we would wiſh, for a weak conſtitution, not the leaſt ſign of ſeparation, or even diſcharge of matter, could be obſerved.

Now, where this is the caſe, the effect of volatiles, ſuch as the *ſal. c. c.* with cordial medicines added to the bark, will be ſurpriſing in leſs than twenty-four hours. There are numberleſs inſtances, in which, from experience, we are induced to believe, that the bark, if given, may prove a ſpecific remedy; but our expectations are frequently diſappointed by the ſtomachs of many people rejecting it, when given in the uſual form; and, to ſome, a light decoction, or the ſimple tincture, has proved as offenſive as the powder or extract. Where this has been the caſe, I have tried the cold infuſion, which has proved agreeable to the ſtomach, and efficacious to all intents and purpoſes. I will not attempt to reaſon with thoſe who may aſſert, that none of the virtues of the bark can be obtained by cold water ſtanding on the powder twelve, or even twenty-four hours, and ſhall make no anſwer to ſuch objectors, but, in caſe they have not uſed it, adviſe them to make trial of it, and not to be prejudiced by reaſoning on the virtues of the bark remaining after infuſion; and I muſt beg them to remember, that I have here recommended it *only* where the bark, in any other ſhape, will not ſtay on the ſtomach; and, probably, ſome may be induced to make trial of it, when I declare, this is not a method of giving the bark found out by myſelf, though I have given it thus for ſome years; and to prove that my aſſertion is true, they will find, that it was the original way of giving it, as *Geoffroy* relates, (*vide Geoffroy*'s Hiſtory of Drugs, publiſhed by *G. Douglas*, p. 303) when its virtues were firſt diſcovered by the *Indians.*

I AM aware of the ſentiments of ſome gentlemen of the profeſſion of ſurgery, who from repeated obſervations are convinced, that mortifications will proceed with great vehemence to a particular point, and then ſpontaneouſly ſtop. This might be urged in reſpect of fevers, &c. but I dare ſay, that thoſe gentlemen, whatever opinion they may have of the power of Nature, would, were it their own caſe, think it right to follow this rule, *principiis obſta*, and not wait for an expected criſis that may never happen, or be imaginary at laſt. I might add further, if I would puſh the argument to the utmoſt, that, on this ſuppoſition, there is no neceſſity for amputating a limb in a mortification, becauſe I have ſeen two or three inſtances, where the bones, as well as the muſcles, have ſeparated from the ſphacelated parts without any aſſiſtance from ſurgery.

THE lixivial fomentations are ſtrongly recommended by ſome; but I have ſometimes fomented with ſtrong decoctions of the bark, and made uſe of the powder that remained after the boiling, by way of cataplaſm, and have thought I ſaw advantages from their uſe.

I GENERALLY uſe the common *fotus*, with the addition of a third part vinegar, which is certainly as good an antiſeptic, as any other application hitherto recommended. The ſtale-beer poultice, with *theriaca Londin.* is in general the beſt bed to lay the limb in, as it is ſoft, reſiſts putrefaction, and gives warmth to the ſound parts, thereby promoting digeſtion; though I have often been obliged to change this poultice for bread and milk, with ſome *theriaca*, as the former ſometimes occaſioned great pain.

THE dreſſings in general, that I think ſucceed beſt, are the *linimentum arcæi*, ſoftened down with *balſ. capivi*, and a ſmall proportion of *ung. ſambucin.* ſometimes the *ol. terebinth.* is added; at others, equal parts of *decoct. cort. Peruv. & tinct. myrrhæ*, has been more ſerviceable than any other topical remedy.

I KNOW that it is the practice of many, to make deep ſcarifications into the ſound parts, till the blood flowing ſhews they are got beyond the *ſphacelus*, and, inſinuating their dreſſings, dipped in warm digeſtives, animated with *ol. terebinthinæ*, flatter themſelves, that the ſeparation of the mortified and putrid parts is thereby accelerated; but I have ſeen great miſchief conſequent to ſuch treatment: for, by wounding either the tendons, or other inelaſtic parts, the inflammation has been again revived, and the ſphacelation has proceeded by haſty ſteps.

I KNOW that it is thought by ſome, who recommend very deep inciſions, that advantages have ariſen from ſcarifying the ſphacelated parts, as a moſt offenſive *ichor* has followed the knife. This I do allow; but then I would never go deeper, in making the ſcarifications, than the cellular membrane, which will anſwer every intention, for which ſuch inciſions ought to be made.

As the ſeparation advances, it is neceſſary to wrap up the ſphacelated parts in camphorated ſpirit, with *ſal. ammoniac* in it, to prevent the ſtench being offenſive, and otherwiſe prejudicial to the patient.

IT is now a known fact, that the *ſphacelus* frequently affects the bones, as well as the muſcles, veſſels, and integuments,

guments, and will ſpontaneouſly ſeparate without any chirurgical aſſiſtance: though we need not wait for this, yet it is now an eſtabliſhed rule, never to think of amputating a limb in a ſtate of ſpreading mortification, nor indeed till the granulations have totally ſeparated the putrid parts from the ſound. The patient ſhould likewiſe recover his ſtrength, and the matter become thick, and leſs in quantity, before amputation is made; for, while things are going on well, we ſhould not be too much in a hurry to take off the limb, as an hour too ſoon may be fatal, and poſtponing it a day longer may give ſecurity to the operation.

WHATEVER good appearance a wound may have, we ſhould not be too haſty in omitting at once, after amputation, the uſe of the bark, where it has in any caſe proved efficacious, but rather diſcontinue it by degrees, and even *then* be very attentive to the ſtate of the ſore; for, ſhould the ſurface become gloſſy, the fleſh pale and flabby, and the diſcharge thin, and increaſed in quantity, on leaving it off, we cannot be too early in a freſh adminiſtration of it.

In large ulcers of the legs, of many years ſtanding, which have been frequently healed, and the ſkin repeatedly ſtretched to cover the ſores, it at length becomes incapable of any further extenſion of its fibres, and grows thick and callous at the edges; in ſuch caſes, to give weight to the ſentence of condemning a limb to amputation, it is ſometimes urged, *that the loſs of ſkin hath been ſo great, that it will be impoſſible to get the ſore ſkinned over.*

In reſpect to old ulcers, this is *in general* true; but, in ſome inſtances which I have ſeen, had this maxim been followed, the poor patients would unneceſſarily have loſt their limbs: therefore, I think it my duty to declare, that, on my firſt ſeeing them, and obſerving what havock the *ſphacelus* had made, my real ſentiments were, that, when the habit of body was mended, nothing but amputation could give them a chance of ever being free from an ulcerous diſcharge; as the mortification, in conſequence of a putrid fever, had deſtroyed ſo much of the ſkin of their legs, that it ſeemed next to impoſſible, it ever ſhould be capable of ſtretching over the ſore, that would remain after the ſeparation of the ſloughs formed in the cellular membrane, which left the ſkin hollow from the upper part of the leg, though ſcarcely enough to have riſqued amputating below knee, had the operation been thought adviſeable.

BETWEEN that hollow part and the ancle, on the calf of the leg, in ſome places, the only ſkin that remained might be about an inch and half broad, till within three inches of the ancle, where the ſkin was left ſurrounding the leg; but all the reſt of it was totally denudated, except that part which I have mentioned: but attention and patience have convinced me, that, in young ſubjects, Nature will ſometimes give great honour to ſurgery; for, in the two caſes that I ſaw, notwithſtanding ſo great a loſs of ſkin, when the bark took place, the ſloughs ſeparated, the matter became good, and the ſores began to heal, and, every method being made uſe of to aſſiſt the ſkin in ſtretching, at length it totally covered the muſcles, to the aſtoniſhment of all, who ſaw the caſes from the beginning.

HOWEVER improbable therefore it might appear, that a cure ſhould be effected, to thoſe who had not been ſo fortunate as to have ſeen ſuch caſes; I dare ſay, in future, where the loſs of ſkin, from the *ſame cauſes*, would formerly have been the principal inducement to have taken off the limb, ſuch inſtances will now induce every humane man to wait with patience, till Nature has exerted her utmoſt endeavours to form a complete *cicatrix*.

THE removal of a limb being thought proper, the neceſſary apparatus to be got ready, if for the leg or thigh, is, firſt a table of a convenient height, on which a doubled blanket and a pillow or two ſhould be laid, for the patient to be placed on during the operation; but, in caſe the upper extremity is to be taken off, a chair in general will be moſt proper. A large diſh, containing the roller or compreſs, ſewed to the middle of a band or ſlip of cloth, about three inches broad, and of a proper length, for the compreſſion of the blood veſſels. The tourniquet, an ell of tape rolled up, the amputating knife, a ſtraight and crooked catilen, a piece of leather ſlit up the middle, a large ſaw, a tenaculum, crooked needles armed, and ligatures of waxed thread looſe, to be employed when neceſſary, ſciſſors and nippers.

In another diſh, lint, flour, a circular piece of fine holland, proportionate to the ſize of the ſtump; rollers, *longats* of cloth and plaiſter, ſeveral pieces of lint armed with digeſtive, as well as the pledget of tow; ſeveral compreſſes of tow of different ſizes, a looſe knit cap, with pieces of tape ſewed on it; pins, and ſome common needles with thread. I ſhall firſt deſcribe the amputation of the lower extremity.

The things above mentioned being prepared, and your patient properly placed on the table, and well ſecured by your aſſiſtants, you firſt apply the band, on which the roller or compreſs is fixed, higher or lower on the thigh, according as the operation is to be performed, either above or below the knee.

If the thigh is to be amputated, you place the compreſs according to its length, immediately on the artery, as high as you can on the upper part of the thigh, an aſſiſtant is then to retain it in that ſituation, till the ends of the band are carried, one anteriorly, the other on the back part of the thigh, when they meet on the fore part of the thigh, one extremity is to be paſſed through the ſlit of the other, like the uniting bandage, and the longeſt end ſhould be drawn tight, to ſecure the compreſs on the artery, and is then to be conveyed on the back of the thigh, immediately over the firſt circle of the band, continuing it over the compreſs placed on the artery, ſo as to meet the other extremity of the band, when both ſhould be pulled *very tight*, and faſtened with pins. This band ſhould be about three inches broad, and made of double cloth, and ſtrong; the length depends on the ſize of the thigh, as does the proper place for making the ſlit. If the leg is to be taken off below the knee, the compreſs of the band is to be placed on the artery, on the lower and under part of the thigh, at the beginning of the ham, between the large tendons, commonly called the ham-ſtrings. The knee being bent when the bandage is applied, makes a better bed for the compreſs. Every other part of the proceſs in applying it is the ſame as that mentioned above, making the ſlit at the moſt convenient part, for its being faſtened afterwards with pins. There is one thing to be remarked, which is mentioned by Profeſſor *Monro* in the Medical Eſſays of *Edinburgh*, *viz.* that the compreſs ſhould not be either ſo large or thick, as not to fall in eaſily between the muſcles, nor ſo hard rolled up, as not to yield to the preſſure made by the tourniquet.

THE tourniquet is then applied immediately over the circular band and its compreſs, at firſt ſo lightly as only may keep it from ſlipping. Surgeons make uſe of two ſorts of tourniquets, to ſuppreſs the hemorrhage during the amputation of the extremities. The one is a very ſtrong band or fillet, made of ſilk or worſted, a little more than an inch in breadth, and about an ell in length, which ſurrounding the circular band, above mentioned, the two ends paſs through two ſlits, cut tranſverſly at an inch from each extremity of a piece of thick *Ruſſia* leather, about three or four inches long, and about two inches and a half wide. The ends of the fillet are then to be tied in a firm but ſlipping knot, leaving a ſufficient ſpace for a round piece of wood, about five inches long, and three quarters of an inch thick, to be introduced between the fillet and the piece of leather; the aſſiſtant, when directed, begins to turn the piece of wood; by which means the ligature or fillet is twiſted ſo tight, as to prevent the blood from paſſing through the artery. This is effected without taking up the ſkin into the twiſt of the ligature, the leather being immediately under the turnſtick. Mr. *Sharpe*, and ſome others, prefer this to *Petit*'s ſcrew-tourniquet in private practice, thinking it prevents pain, by making a more equal preſſure on the veſſels and nerves in general, though I always make uſe of the ſcrew tourniquet myſelf; yet, as ſome may have heard the other recommended as preferable, I have been more particular in deſcribing it: but where there is not all the neceſſary chirurgical aſſiſtance immediately at hand, as is the caſe after an engagement by ſea or land, the ſcrew tourniquet muſt have the preference, as it may be applied to prevent hemorrhages from proving fatal before there is time to perform amputation.

THE part is then fixed upon for making the firſt inciſion through the integuments, half an inch below which the tape is to be paſſed round the limb, (making ſeveral turns, *as tight as poſſible,*) and to be pinned. It ſeems to me to be the intention of many operators, to apply this tape only as a guide for the knife, as directed by Mr. *Sharpe*, and to cut either above or below it, as it may happen: with this intention, they roll it round the limb looſely.

Heister indeed, in his book of ſurgery, recommends the tape to be applied tight round the limb, in order to keep the fleſhy parts cloſe to the bone, his intention being to amputate, by carrying his inciſion through the integuments and muſcles down to the bone at once. He likewiſe ſays, that the amputation is to be made below the tape, as does *Monro* in the Medical Eſſays. The *French* ſurgeons, in their Memoirs, are likewiſe of the ſame way of thinking; by which means they found difficulty in healing the thigh after an amputation; beſides, a ſecond operation, to take off the protruding bone, ſometimes became neceſſary, and this even ſome months afterwards. *Vide* Monſ. *Louis's Accounts* in the Memoirs of the Academy of Surgery. *Le Dran* does not apply the tape for the direction of the knife, but to keep the muſcles compact and cloſe to the bone. I muſt here remark, that cutting above the tape will prevent the operator from being embarraſſed when he is to make his ſecond inciſion, which is to go through the muſcles to the bone, as the tape generally ſlips off, and is in the way of the knife, if the firſt inciſion is made below it.

Another advantage, which ariſes from pulling the tape as tight as poſſible in paſſing it round the limb before it is pinned, is, that the ſkin will be raiſed from the ſubjacent muſcles, when the aſſiſtant draws it up, which cannot be the caſe, if the inciſion is made below the tape; but, by carrying the knife a little above it, the integuments will be divided without cutting into the muſcles, the patients ſaved from ſome pain, and a neatneſs given to the operation.

As ſoon as the tape is thus applied, the tourniquet is to be ſcrewed tight: the circular inciſion through the integuments being made by the diſmembring knife, if any little parts of the integuments ſtill adhere to the muſcles, they ſhould be ſet at liberty with the point of it, ſo as that the ſkin may ſlip eaſily over the muſcles. The aſſiſtant muſt then draw up the ſkin as high as poſſible, which the operator may aſſiſt with his fingers. The knife is then applied cloſe to the edge of the integuments thus drawn up, and carried quite through the muſcles down to the bone, in a circular manner, as before. The *perioſteum* is then to be cut through with the *catlin*, as high as poſſible on the bone, and, at the ſame time, the lower edge of the membrane ſhould be ſtripped a little downwards with the knife, to make ſufficient ſpace for the application of the ſaw.

WHEN amputation is made above the knee, it is always adviſeable *to ſeparate the muſcles by the catlin from their attachment to the linea aſpera*, which will enable the operator to cut off a conſiderably larger portion of the bone, than he could have done, without tearing the muſcles on the under part of the thigh with the ſaw. By this means likewiſe he will avoid many diſagreeable circumſtances during the cure, and make a much neater ſtump when healed.

BEFORE the bone is ſawed, you apply the piece of leather, which ſhould be about ſixteen or eighteen inches long, and of a proportional breadth, to encloſe the muſcles, and ſecure them from the ſaw, while the bone is cutting through. For this purpoſe, the leather muſt be ſlit through the middle, about half way of its length, in order to admit the bone. The undivided part is held up by your aſſiſtant, ſo as to keep it ſmooth on the divided muſcles of the end of the ſtump; and you take hold of the divided parts of the leather, on each ſide of the bone, and croſs them ſo as to keep them quite cloſe to the bone, and ſmooth on the muſcles. Theſe ends being likewiſe delivered to your aſſiſtant, you preſs the muſcles as high up as you can; for by this means they are kept out of your way, and more bone may be taken off, which is a very eſſential thing to the cure, and prevents a *ſugar-loaf* ſtump, as it is called, which has ſometimes required a ſecond operation, in order to its healing.

THE muſcles being drawn up as high as poſſible by your aſſiſtant, and the bone cleared from its inveſting membrane, the ſaw is applied, and the bone is cut through: but, in order to facilitate the paſſage of the ſaw, your aſſiſtant, who ſupports the lower part of the limb that is to be taken off, ſhould rather preſs it gently downwards at firſt; but great care muſt be taken to keep it ſtraight, when the ſaw has nearly done its buſineſs, leſt the bone ſhould break off, and ſome ſharp point remain, that might require the aſſiſtance of the nippers to remove it; but, if the aſſiſtant is careful in ſupporting the extremity, and the operator, at the ſame time, moves the ſaw with caution, the end of the bone will be preſerved ſmooth.

It is well known, that the coats of the arteries are very elaſtic, and that frequently, by their retraction between the divided muſcles, and their own contractile power, hemorrhages from very conſiderable veſſels, even of the thigh, have been ſpontaneouſly ſuppreſſed; but, that this is not uſually the caſe, daily obſervation evinces, as the mouths of the bleeding veſſels will often remain beyond the fibres of the divided muſcles in amputations, and bleed with a full ſtream till reſtrained, by being encloſed within a ligature, which may often be done without a needle. The cellular membrane, in ſome ſubjects, becoming inflated, and the muſcles ſwelling by means of the obſtructed lymph, even during the amputation of a limb, will frequently, in a ſhort ſpace of time, contribute, by compreſſing the divided veſſels, to ſtop the hemorrhage. Some ſuppoſe, a little piece of coagulated blood becomes the plug in the mouth of the divided veſſel: others again deny, that there is ſuch a piece of *coagulum* in the extremity of the artery, as by the application of ſtrong ſpirits or brandy the bleeding has been reſtrained in brutes, yet, on examination of the veſſels, no ſuch clot of blood has been found at the extremity of the divided artery. *Vide* the *German* Acts.

BUT though, in the experiments on brutes, the hemorrhage may have thus been reſtrained, and we may have obſerved, that the ſmall veſſels in the human ſubject have ceaſed bleeding by the application of dry lint, with flour ſprinkled on it, and gentle preſſure, yet theſe are by no means ſufficient arguments to embolden us to expect the contraction of an artery within the muſcles by the power of its own elaſtic coat, or to depend on the compreſſion of the ſurrounding parts, by the inflation of the cellular membrane and muſcles; or to truſt to ſuch ſtyptics, as ſpirit of wine or dry lint with flour, to reſtrain the hemorrhage of the principal arteries in an amputated limb; nor is the compreſſure round the limb by a roller, or even that brought over the end of the ſtump, an adequate ſecurity againſt the *impetus* of blood, when the ſymptomatic fever comes on, however quiet things may ſeem immediately after the operation. Thoſe, who have made uſe of the *agaric* have been deceived in their expectations, when *that* only has been deemed ſufficient to prevent the bleeding again of the divided artery; and ſtyptics, whether vinous ſpirits or powder, have frequently diſappointed the operators, and a hemorrhage has proved fatal to their patients; and the *ſponge* has its inconveniences.

The actual cautery was formerly recommended; but, whatever ſpecific quality we ſuppoſe the ancients to have entertained of fire in ſtopping mortifications, their great object ſeems to me to be rather this, that, by removing the mortified part with the actual cautery, they might prevent a fatal hemorrhage, which muſt unavoidably follow the taking off the limb, if ligatures were not afterwards made on the veſſels; but this piece of ignorance and cruelty has been long ſince exploded, as well as the application of eſcharotics to the mouths of bleeding veſſels, on account of the violent pain they give, as well as their inefficacy; for, when the ſloughs have ſeparated, the veſſels have bled afreſh: and this indeed has happened upon the application of the actual cautery, which, being too hot, has brought off the eſchar it had made. *Fabricius Hildanus* ſays, page 802, "*Vaſa aut ligabit aut cauterio actuali claudet.*" But the actual cautery, at this time, is never employed, but where we are incapable of coming at a veſſel to incloſe it in the nooſe of a ligature. A kind of practice not leſs cruel, though more effectual, than the application of a red-hot iron, was once received amongſt the ſea ſurgeons: I mean that of reſtraining the hemorrhage from an amputation, by the application of a pledgit dipt in boiling turpentine. But I underſtand this has long ſince grown into diſuſe.

LE DRAN, in his treatiſe on the Operations in Surgery, ſays, that a button of vitriol or alum, applied to the end of the bleeding veſſel, and properly ſecured, will reſtrain the hemorrhage in amputations; but, as accidents have ſometimes happened, he prefers the ligature as the ſecureſt method; though this, he thinks, has likewiſe its inconvenience, as it is almoſt impoſſible to take up the artery without including the nerve that accompanies it; in conſequence of which ſometimes convulſions follow, which make it neceſſary to cut the ligature.

AMBROSE PARE` is of a different opinion, page 976. He made uſe of the artery *forceps*, and prevented the hemorrhage, by including the veſſel within a ſtrong ligature, made with thread waxed. He aſſures us, that nothing is to be feared by taking up the muſcles and neighbouring parts with the veſſels, and is of opinion, that the veſſels will thereby ſooner heal.

HEISTER ſeems to have copied *Ambroſe Parè*, in uſing the artery *forceps*; but, after that, he paſſes the crooked needle, armed with waxed thread, by way of ligature, to ſecure the extremities of the veſſels from bleeding; but recommends the buttons of *Roman* vitriol, when the arm is taken off below the elbow, in preference to the ligature. My ingenious friend, Mr. *Charles White*, of *Mancheſter*, has given us an account of the *ſponge* being made uſe of with ſucceſs in reſtraining the flux of blood in amputations, where the largeſt arteries have been divided.

It is ſufficiently known, that the moſt painful part of this operation is the taking up the veſſels with the needle, the nerve being included in the ligature; for, when an artery has, in the ſame ſubject, been drawn out with the *tenaculum*, and a ligature paſſed round it, and tied * *ſufficiently* tight to prevent its bleeding, the patient has not been ſenſible

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[*] I have ſaid *ſufficiently*, becauſe many people think, that the harder they draw the nooſe the greater ſecurity will be obtained. In this they are miſtaken; for, in caſe the ligature is very hard twiſted, they may eaſily cut through the coats of the artery; but the ligature being made of a ſufficient number of lengths of the ſhoemaker's threads well waxed together, and made flat, the nooſe may be drawn moderately tight, and there will not be danger, either of its cutting through the veſſel, or of a hemorrhage enſuing; for the ſides of the artery being brought into contact, and kept ſo, ſoon unite, and not only in the part compreſſed, but moſt likely as high up as where the next branch is ſent off from the trunk of the veſſel. This is known to all thoſe, who have examined the parts after death, where arteries have been ſecured by ligatures, though of very ſhort ſtanding.

ſenſible of the leaſt pain. *Le Dran* mentions the ill effects of the nerve being tied with the artery; and I make no doubt, but that the ſame obſervation induced thoſe, who have been trying the agaric of the oak, or ſpunge, to make the experiment; or they certainly would not have given up the ligature, whoſe ſecurity has been its recommendation for ſo many years paſt.

THE cruelty of including the nerve within the ligature, if ſecurity could be otherwiſe obtained, would be unpardonable; and a fatal hemorrhage enſuing, the trying of agaric, or any other application, to prevent the bleeding of the divided veſſels in amputation, would be very diſagreeable to a man of humanity.

I HAVE, therefore, for many years paſt, wherever I could lay hold of the artery with the *tenaculum*, by paſſing it through its ſides, drawn it forward from the muſcles, which is extreamly eaſy to be effected, as the artery lies looſe in the cellular membrane. While I keep it advanced in this manner, I order my aſſiſtant to paſs a *flat* ligature round it, above the *tenaculum*, and draw the nooſe ſufficiently tight, to prevent its bleeding again; but, when I draw the knot of the ligature tight, I always carry the ends of the ligatures back againſt the ſtump, which is worthy of notice; for thoſe, who have been ignorant of this method of tying the veſſels, when the needle and ligature had paſſed on each ſide of the veſſel, and the nooſe was made, in attempting to draw it cloſe, have, from inattention, at the ſame time drawn the veſſels towards them, by which means the ligature has either ſlipped off, or the part of the artery has ſeparated, which may eaſily be done, if we conſider, that the *ſpiral* fibres are only kept in contact by the cellular or connecting membrane; and this happening two or three times in the ſame ſtump, the danger was then declared to be great, ſuppoſing the arteries to be rotten; whereas the fault was their own, who, when they made the ligature on the veſſels, drew them forwards with violence, and occaſioned their rupture.

THE experiment of tying ſome of the arteries without, and others with the nerve, has been ſo repeatedly made in theſe different manners, on the ſame patient, that it would be the higheſt cruelty to attempt the latter, where the former can be effected, as the drawing the knot *ſufficiently* tight never cauſes the leaſt pain, where the artery alone is included.

THIS fact can be aſcertained by hundreds, who have ſeen me amputate: but, as this appears to be an *improvement* on the common method, many objections, as uſual, are made to its reception.

THE firſt is, that the ligature will ſoon cut its way through the veſſel, and a fatal hemorrhage enſue. However, I defy thoſe, who ſuggeſt ſuch *apprehenſions*, to prove a ſingle inſtance of an hemorrhage from any veſſel tied in this manner; nay, reaſon as well as experience demonſtrate, that it is much more likely to happen, where a conſiderable quantity of fleſh is taken up with the veſſel, and included in the ſame nooſe; for the fleſh will ſhrink when the circulation has been a while interrupted by the ligature; the compreſſion on the veſſel conſequently will be leſs, and the encreaſed circulation, from the ſymptomatic fever, will often open the mouth of the divided and now relaxed artery, and produce an hemorrhage, which generally requires a freſh paſſing of the needle and ligature to ſuppreſs it. Profeſſor *Monro*, though he makes uſe of the needle, and well ſurrounds the veſſels, yet directs to take in as little fleſh, and as few tendinous and ligamentous fibres, as poſſible, into the nooſe, obſerving, that there will be leſs pain by excluding from the ligature the nervous parts. Mr. *Cheſelden* has mentioned, in his Appendix to Mr. *Gataker*'s tranſlation of *Le Dran*'s Operations, (*vide Gataker*, page 461) that every veſſel ſhould be tied with as little fleſh included in the ligature as may be, though he does not give any reaſon why it ſhould be ſo. However, it is plain, that he has not the point in view, of which I particularly am careful, the leaving out the nerve.

It is well known, that violent ſtartings, and ſpaſms in the ſtump, with a ſevere ſymptomatic fever, are frequently attendants on amputation, when the operation is performed in the uſual way; but I can ſay, with great truth, that hardly any of theſe complaints are conſequent to the operation, when the nerves are not included in the ligatures made on the arteries.

ANOTHER very evident advantage is, that, as in taking up the arteries with the needle, when paſſed deep into the muſcles, by way of taking good hold, to prevent the ligatures tearing their way out, too ſoon, they remain in the ſtump long after the artery is healed, and frequently require cutting out, and often ſinuſſes are formed, if that is not done, which require dilatation; ſo on the contrary, by taking up the artery alone, the veſſel ſoon heals, and the ligature generally comes off ſpontaneouſly in eight or nine days after the limb is taken off.

THE cruelty of including the nerve within the nooſe of the ligature, for reſtraining a hemorrhage, was not ever more obvious, nor its effects more violent, than lately in a man that was caſtrated. He was not wanting in reſolution under every other part of the operation; but when the ligature was making on the ſpermatic chord, as the nooſe was drawing cloſe, the pain became ſo intolerably great, that he could not refrain from crying out, and uttering expreſſions, that denoted his ſuffering the greateſt torture. I believe his ſhrieks had an effect on the humanity of the operator, which made him decline paſſing a ſecond ligature, as uſual, by way of ſecurity againſt future bleeding. As ſoon as the operation was finiſhed, the patient was put into bed, and an anodyne given him, but to very little purpoſe; for the agony was ſo great, that the man was raving, nor could they keep him quiet in his bed; and, from the violent ſtruggles he made, the ligature came off from the chord, which the man would not diſcover, as he was then eaſy, and his apprehenſion of a freſh ligature being made, he declared, made him wiſh rather to die, than undergo it again. Indeed, that had like to be the caſe, had not his faintings made the young gentleman, who was left to take care of him, examine the bed, where the great quantity of blood readily accounted for the *ſyncope*: He had great pain in the anterior part of the *abdomen*, and violent ſpaſms, in conſequence of which, the ſpermatic chord was drawn up almoſt as high as the ring of the external oblique muſcle, though it was left remarkably long by the operator, it not being in the leaſt diſeaſed.

We need not take up much time to find out the cauſe of all theſe ſymptoms; but it will be an act of humanity even to ſuggeſt ſomething likely to prevent them in future. I would recommend it to the operator, as ſoon as he has cleared the ſpermatic chord, as if a ligature was to be paſſed round it, to order an aſſiſtant to take the chord between his fingers and thumb, and make a gentle preſſure on it, near to the ring of the abdominal muſcle; the operator ſhould then cut through the chord; and, if the artery ſhould not bleed, when the preſſure by the aſſiſtant is removed, before the veſſels contract, the orifice of the ſpermatic artery may eaſily be diſcovered, and drawn out by the *tenaculum:* then, by including it within a flat ligature, the hemorrhage will be prevented, not the leaſt pain given by tightening the nooſe, and neither ſpaſms, nor, generally, any great degree of ſymptomatic fever follow. I know it has been recommended by ſome, to make a preſſure on the chord, as it paſſes over the bone in the groin; but the chance of the compreſs's ſlipping, I ſhould think, makes this practice not warrantable, as I have ſeen the ſpermatic artery dilated to the ſize of a crow quill, where the teſticle has been diſeaſed for any length of time, from which conſequently a fatal hemorrhage may be expected, if left without a ligature. Poſſibly this objection may have more weight, if I ſay more than one have died by making the trial, according to the recommendations of thoſe, who have ſeen it practiced abroad; but ſome of our brethren are, like *Scrub* in the *Stratagem,* very fond of the laſt new flouriſh of the razor. I am of opinion, that the inducement to make the trial of compreſſing the chord on the bone might be from a humane intention, as probably the perſons, who made the experiment, had ſeen the horrid cruelty, and direful conſequences, of making the ligature on the chord in the uſual way. It may be urged, the conſequences are not always ſo terrible as thoſe here related. I grant it; but making the ligature is always attended with *very violent pain*, and preventing *that* muſt be wiſhed for, not only by the patient, but by every ſurgeon not diveſted of humanity.

After the principal arteries are ſecured, the tourniquet ſhould be rendered quite ſlack, and every degree of preſſure totally removed from the veſſels, otherwiſe the branches next in magnitude will, as before obſerved, become dilated, and appear formidable, and conſequently will require their extremities alſo to be ſurrounded by ligatures, to prevent farther bleeding; and this may be done almoſt *ad infinitum*, if the tourniquet is only ſlackened ſufficiently for the diſcovery of another branch, after the principal arteries are tied. I have ſeen the needle often employed eight or ten times in one ſtump below the knee, and I think once, fourteen or ſixteen ligatures were made by the crooked needle in an amputation of this kind; whereas, if operators would pay attention to Profeſſor *Monro*'s obſervations in the Medical Eſſays, they would find my remark confirmed, for by removing ſuddenly the tourniquet and band, with the compreſs, that had been applied on the principal trunk of the artery, the blood would be then equally diſtributed to the whole vaſcular ſyſtem of the ſtump, and no one veſſel would be dilated ſufficiently to produce any hemorrhage, that would require the ligature; and it is very ſeldom, that I have occaſion to tie more than three or four veſſels, even in a very large ſtump. If what I have aſſerted is true, the propriety of obſerving this method will immediately ſtrike any man of humanity, who muſt have obſerved, that the greateſt pain in amputation is owing to the ligatures made on the veſſels, when performed in the uſual manner; but, would we adopt the manner above ſuggeſted, taking up the veſſel with the *tenaculum*, omitting the nerve in the nooſe, and leſſen the number of ligatures made on the veſſels, this would not only prevent the repetition of the moſt excruciating pain in the operation, but proportionably leſſen the chance of ſpaſm, and conſequently the ſymptomatic fever.

To reap the advantage of the double inciſion after the operation, the ſkin ſhould be brought forward by an aſſiſtant, and, if the amputation be made above the knee, one end of the roller ſhould be faſtened round the body, or a circular band being previouſly ſecured round the waiſt, the end of the roller may be ſewed to *that*, and, by paſſing the roller round the thigh from above downward, making the neceſſary turnings, to keep the roller ſmooth, it will at laſt arrive at the edge of the ſtump. We ought to be very exact in this point; for, if we ſhould not carry the circles exactly to the edge of the ſkin, we ſhall find, that, if they are not near enough to the end of the ſtump, the ſkin will ſwell below it; and, if they are carried beyond the edge of the ſtump, the matter will be lodged there, and produce more or leſs miſchief, according to the acrimony of the diſcharge.

I THINK, in general, we are rather too ſollicitous in bringing the ſkin forward early after an amputation, expecting it is to fix immediately; but I have frequently ſeen miſchief done by the tightneſs of the roller, when applied with this view, and abſceſſes have been the conſequence. When the roller is applied with this intention below knee, ſtill greater caution is neceſſary, as the edges of the ſawn end of the *tibia*, by the preſſure of the roller, have made their way through the integuments; therefore, we ſhould always, in thin people, lay a compreſs of tow or cloth on each ſide of the *tibia*, ſufficiently thick to prevent the roller from preſſing too tight on the bone, when we come to paſs its circles round the lower edge of the ſtump, and, when the ſkin is well ſupported by the laſt circle of the roller, we ſhould pin the end there.

THE proper dreſſing is dry lint on the bone, then a circular piece of old holland, to lie within the ſkin on the muſcles, which is of great ſervice, as the reſt of the dreſſings will come off eaſily, when this is taken hold of; dry lint ſhould be applied on this piece of linen, to fill up the cavities in the ſtump, and, in caſe the ſmall veſſels ſhould weep, a little flour may be thrown on the bit of cloth, or on the next layer of lint, which may alſo be aſſiſted in its compreſſion, by applying a ſoft bolſter of tow on the lint. Small pledgets of the digeſtive ointment, ſpread on lint, ſhould be made uſe of to the edges of the ſtump, which will prevent the ſticking of the dreſſings. A large pledget of the digeſtive ointment, or lint and a compreſs of tow, finiſhes the applications, except ſuch as are to ſecure the dreſſings from falling off. *Longuets* of leather and of cloth, ſpread thin with adheſive plaiſters, are to croſs each other, as they go over the end of the ſtump, like the rays of a ſtar at its center, and may be kept in their places by paſſing a ſlip of ſticking plaiſter, ſpread on leather, round the whole ſtump, ſo as to prevent any of the points getting looſe.

THE cap is then to be applied, but in a manner different from that in which I have frequently ſeen it done by very good operators: they ſlip it over the ſtump, and pull it on till the ſtump is nearly covered, as they would draw it over their heads. One would conclude by this, that they intended hereby merely to keep the part warm; but they ſeem not to conſider, that, by pulling on the cap thus, they puſh the ſkin from the end of the ſtump towards the laſt circle of the roller; by which means the ſkin becomes inflamed, and is ſometimes cut into a ſore by the reſiſtance of the roller, which paſſes round the ſtump. To draw it on properly, let the operator ſtretch the cap with both his hands, and the aſſiſtant do the ſame, till the crown of the cap becomes quite flat, and the opening wide enough to admit the end of the ſtump, ſo that the crown of the cap may preſs properly on the end of the ſtump, as well as the ſides; and, when it is thus ſecured by another roller wound over it, from the end of the ſtump looſely upwards, it will be of great ſervice, not only for *warmth*, but as a very good bandage to keep the dreſſings in contact with the end of the ſtump; and the cap, by ſtrings ſewed to it, may be faſtened round the body.

I BEFORE remarked, that, in general, the roller is often drawn tight too ſoon, by way of keeping the ſkin from retiring, as by this means the edges of the ſtump ſwell, and digeſtion is prevented: therefore, till this comes on, and the ſtump puts on the appearance of healing, the bandage ſhould be rolled on looſely, after which it is of the greateſt ſervice to keep the ſkin as forward to the edges as poſſible. Should any *illneſs* come on after the amputation of a thigh, and the muſcles ſhrink from the bone, and threaten a ſugar-loaf ſtump, the method of rolling recommended by Mr. *Wright*, of *Sheffield*, *Yorkſhire*, is of particular ſervice in the healing, and is as follows in his own words: "When ſuppuration is perfectly eſta-"bliſhed, the ſwelling of the ſtump "ſubſided, and it becomes neceſſary to

" remove the under roller, that ſupports
" the muſcles and integuments, I di-
" rect a large piece of ſkin to be ſpread
" thin with ſticking plaiſter. This I
" cut into ſtraps, about two inches
" broad, and long enough to ſurround
" the thigh. I likewiſe provide a long
" roller, of good ſtrong linen cloth,
" which I cauſe to be duſted over with
" powdered roſin. When the dreſſings
" and the under rollers are removed, I
" direct an aſſiſtant to graſp the thigh
" with both hands, and to draw the
" ſkin and fleſh gently downward over
" the bone. Then I apply the firſt
" ſtrap of ſticking plaiſter round the
" thigh, as high as I can conveniently;
" the next with the upper edge ſome-
" thing over the lower edge of the firſt,
" and ſo on till I have covered the whole
" thigh. Then I apply the roller mo-
" derately tight, and ſprinkle it with
" ſpirit of wine. The dreſſings to the
" ſtump to be ordered as uſual.

" THE plaiſters ſtick very faſt to the " hairs and ſkin, and will keep their " ſituation for a conſiderable time, not- " withſtanding the motion of the part. " The roller, when cemented with " roſin, becomes fixt, and forms a ſort " of caſe to the thigh, which is ſufficient " to ſupport and counteract the reſti- " tutive power of the muſcles and in- " teguments, without obſtructing the " motion of the nutritious fluids, or " producing any one inconvenience that " I know of.

" I HAVE found it neceſſary to renew " this caſe once, and ſometimes twice, in " the courſe of healing the ſtump. I have " ſometimes dipt the roller in a ſolution " of glue, to form this caſe withal; " but I have no reaſon to think it pre- " ferable to the powdered roſin cemented " with ſpirit of wine.

" SINCE I have made uſe of this " method, the ſtump is generally healed

" in ſix or ſeven weeks, without any " exfoliation of the bone; and, inſtead " of being pointed, ſo long as the caſe " continues upon the thigh, the *cicatrix* remains concave, and in very " large fleſhy thighs has not exceeded " the ſurface of a crown-piece. Upon " removing the caſe after the cure, the " ſoft parts recede a little, and the bone " becomes more prominent; but in no " degree to occaſion any inconvenience.

" IN one operation, I was under a " neceſſity of making the ſection ſo " high, that there was no opportunity " of the double inciſion. However, " by the means above directed, the " ſtump was healed within two months, " and the ſcar was remarkably ſmall."

WHILE the ſingle inciſion was practiſed, the difficulty of preventing a pyramidal ſtump muſt, no doubt, have been great: the muſcles contracting, and too little ſkin being left, the bone, particularly in amputations of the thigh, neceſſarily projected; but this very rarely happens when the double inciſion is performed with accuracy and attention, particularly obſerving to diſengage the muſcles of the thigh from the *linea aſpera*; for this being done, a conſiderably greater portion of the *femur* may be taken off by the ſaw, when the muſcles are well drawn back. We are much obliged to our countryman, Mr. *Cheſelden*, for this improvement of the operation by the double inciſion: nevertheleſs, there are ſome people, I am told, who, for reaſons beſt known to themſelves, continue to amputate, even at this time, with one inciſion down to the bone.

THAT the muſcles and integuments may not retire from the end of the bones, *Ambroſe Parè* recommends the croſs ſtitch, which practice has been diſcontinued for many years; but my worthy and ingenious friend, *Samuel*

Sharpe, ſeems to wiſh the revival of it, and I ſhould ſuppoſe he does ſo from having obſerved, that, notwithſtanding the double inciſion, and the aſſiſtance of the roller in ſupporting the muſcles and integuments, the bone was ſometimes left longer than the ſurface of the remainder of the ſtump, and conſequently became an inſuperable obſtacle to its healing, till the projecting part was removed. This is what Mr. *Wright* complains of, and put him under the neceſſity of continuing the bandage above deſcribed, in an obſervation he ſent me ſome years ſince. I have great pleaſure in communicating this to the public, as too much cannot be ſaid in his favour, both as an ingenious and ſkilful ſurgeon, as well as a moſt accurate anatomiſt, which thoſe only need be informed of, who are very diſtant from his reſidence.

I HAVE frequently applied the ſlips of plaiſter, ſpread on leather, and afterwards the roller ſprinkled with powdered roſin, and, when the circles were finiſhed, they were moiſtened with ſpirit of wine, as directed by Mr. *Wright*; and I think with great advantage in accelerating the healing of the wound. But I have taken the liberty to vary a little from him; for, when the ſkin is brought forward by an aſſiſtant, I apply my firſt ſlip of plaiſter cloſe to the edge of the ſkin on the ſtump, the next about a quarter of an inch lapped over the firſt, and ſo on, till the laſt ſlip of plaiſter is applied on the upper part of the thigh. My aſſiſtant then takes hold of the thigh pretty high, and pulls the ſkin and muſcles forward, which are prevented from retiring by the roller applied as above directed; and I flatter myſelf, there is an advantage in applying the ſlips of plaiſter as I have mentioned: for, when we come to aſſiſt this bandage by croſs ſtraps of the plaiſter, each circle of the plaiſter puſhes that before it towards the end of the ſtump, when the croſs ſtrap of plaiſter is made to ſtick firſt at the upper part of the roller, and ſo on till it arrives at the ſurface of the ſtump: you then pull the ſtrap downwards with your right hand, which will bring the whole caſe and integuments of that ſide down with it, ſo as to make them project greatly beyond the bone; then, with the left hand, you draw forward the caſe of the ſide oppoſite to that, where one end of the ſtrap of plaiſter is already fixed, and then carry the ſtrap over the ſtump, and fix it on the oppoſite ſide, while the ſkin is brought down by your left. The ſame thing is done anteriorly and poſteriorly, as was done laterally. I generally let the roller be quite dry, before I apply theſe croſs ſtraps, as the roſin will be diſſolved, and intimately blended with the webb of the roller: the whole will then become as one caſe. But, if the direction I have given above to diſengage the muſcles from the *linea aſpera* be obſerved, there will be no occaſion for Mr. *Wright*'s bandage, except where too much bone has been left. I have, therefore, applied it frequently on patients in the hoſpital, only to ſhew the pupils the great ſervice it may be of in bringing the ſkin over the ſtump, of which every one is ſenſible in leſs than forty-eight hours after its being applied.

THERE are ſome general rules laid down by ſurgeons, which, it is ſuppoſed, we ought not to deviate from, *viz.* that, in amputations made on the upper extremities, as well as of the thigh and foot, as much as poſſible of theſe parts is to be preſerved; but, if the leg is to be taken off, then the amputation is to be made as near as poſſible to the knee, without riſque of cutting the ligament of the *patella*, that the ſtump may not extend beyond the wooden leg when it is wore. Theſe have been eſtabliſhed maxims with the profeſſors of ſurgery for many years paſt, and are the ſentiments of our moſt modern writers on ſurgery.

I SHOULD ſuppoſe there is not one of the profeſſion of ſurgery, who would not ſay, that, in caſe the joint of the knee could be preſerved, ſo as to be uſeful to the perſon after an amputation of the leg, it ought always to be done.

ABOUT the year 1740, I ſaw a poor woman, who had loſt both her legs from a mortification, in conſequence of being expoſed to the ſeverity of the weather in a very hard froſt, having no other habitation but a barn during her lying-in. Her feet, ſhe ſaid, were firſt attacked, and the *ſphacelus* ſpread up above her ancles, and then ſtopped, without any medical or chirurgical aſſiſtance. The ſkin, ſhe ſaid, after ſome time, began to crack round her legs, and, to her great ſurpriſe, ſoon after, the diſeaſed fleſh and bones ſeparated from the ſound, without the leaſt bleeding; and I dare ſay at leaſt three inches of the lower extremities of the *tibiæ* and *fibulæ* came away with the mortified ſkin and muſcles; and ſhe aſſured me, ſhe made uſe of no other application, but clean rags daily to the parts, with which ſhe was furniſhed by the compaſſionate people of the village, where ſhe lay in this moſt miſerable ſituation. As ſoon as healed, ſhe began to conſider how ſhe ſhould ſupply the loſs of ſo much of the lower extremities, having no idea of walking on her knees, as is uſual, when wooden legs are affixed after amputations below the knee, and at length ſhe hit upon a contrivance, which anſwered ſo well, that you could hardly diſcover ſhe was lame, either in walking on plain ground, or in going up and down ſtairs. Being convinced of this fact, I was very inquiſitive, whether the ſtumps did not at times become ſores, or if it was not very painful to her, to bear her whole weight on the ends of the ſtumps. She anſwered, Not *now*, as ſhe had found out a method to prevent the ends of the remainder of her legs ever from going to the bottom of the caſes ſhe had contrived; which were compoſed of pieces of elder hollowed, and kept together with tin nailed on the elder. Theſe caſes were lined with a ſtocking, which ſhe ſtuffed with wool pretty hard, ſo as the reſiſtance might be always from the *ſides* and *upper part of the caſe*: ſhe ſecured theſe caſes above her knee, and conſtantly padded them in different parts, as ſhe found neceſſary.

I OWN, what I had read in the writings of the *French* ſurgeons, "of patients "walking well by bearing *on the ends of* "*the ſtumps*, as they were well covered "with fleſh, after amputation below "the knee," made but very little impreſſion on me, nor did I ever think of adopting their method; but, when I ſaw the contrivance of this woman, I repeatedly in my lectures recommended the operation, when made below knee, to be as nigh the ancle as the nature of the caſe would admit of; but, on mentioning it in converſation to ſome eminent ſurgeons, I found their opinions were greatly againſt the attempt, they aſſuring me it would be impoſſible to heal the ſtump, if the amputation was made very low; for the tendons, or their *thecæ*, would ſlough, and moſt likely a ſecond amputation might become neceſſary; and to revive the operation with the *lambeau* would be very injurious to my character, as it had been entirely exploded, in conſequence of the ill ſucceſs that had attended it. I therefore laid aſide all thoughts of ſuch a practice, till Mr. *Wright*, formerly a pupil of mine, whom I mention to give credit to myſelf, ſent me the following caſes.

“ ABOUT the year 1754, I was con-
“ ſulted in the caſe of a boy about twelve
“ years of age, who had had a ſcro-
“ phulous diſorder in the ancle joint,
“ for two or three years paſt.

“ AMPUTATION was propoſed and
“ agreed to. The leg and thigh, as is
“ common in theſe caſes, were ſome-
“ thing emaciated. The form and di-
“ menſions of the limb gave me the hint
“ for making the ſection lower than
“ uſual, with a view of fitting ſome
“ machine upon the ſtump, ſo as to
“ preſerve the uſe of the knee joint in
“ walking.

“ I MEASURED from the head of the
“ *fibula* downward, and found I might
“ eaſily preſerve eight inches. I marked
“ the leg with ink, and at every mark
“ I meaſured the circumference, which
“ I found to be as follows.

“ 1 at the head of the *fibula*	10 inches.
2	9
3	8 ¼
4	7 ¾
5	7 ¼
6	7
7	6 ¼

“ I PROPOSED the ſection above the ancle to the boy's friends, and explained the benefit and advantage that muſt ariſe from preſerving the uſe of the knee joint. The deſign appeared to be of ſuch importance, that they deſired it might be done.

“ THE ſtump healed, without any remarkable impediment, in about five weeks. I mention this, becauſe the parts divided were chiefly tendinous, which might have been urged as a chief objection.

“ HE has uſed an artificial leg ever ſince: it is perfectly eaſy to him, and

“ has never galled or hurt him in the
“ leaſt. He riſes up, ſits down, and
“ walks with great facility, the uſe of
“ the knee appearing to be of the
“ utmoſt advantage.

“ Since this, I have had another
“ operation of the like kind, which, in
“ all reſpects, ſucceeded as well as the
“ firſt; and another ſurgeon, reſident
“ in the town, has followed it with
“ equal advantage.”

The opinion I had of Mr. *Wright* made me determine to put my theory in practice, on the firſt ſubject that offered, whoſe caſe ſhould be deemed proper for the trial; but I muſt obſerve, that compound fractures, particularly thoſe from gunſhot, are improper caſes for this, as the bones are generally ſplintered much higher than the place where the wound is made. I have, ſince I received Mr. *Wright*’s papers, performed the operation many times, and it always ſucceeded. I have likewiſe recommended it to other ſurgeons, by whom I was called into conſultation, and they have performed it with equal ſucceſs.

EVERY part of the operation is the ſame as I have recommended in general, except that, after the limb is off, many of the tendons frequently will appear beyond the ſurface of the ſtump, particularly if the bones are ſawed as high as poſſible. When this was the caſe, I have conſtantly taken them off with a pair of ſtraight ſciſſors, which never gave the leaſt pain to the patient, and the wound healed often in leſs time than in caſes where the limb had been taken off higher, without producing the leaſt alarming ſymptom from the time of the amputation to the healing of the ſore. I now wonder, that ſo many objections have been formerly made to the trial, when we conſider, that the eſtabliſhed maxim is, *to take off the fore arm as near the*

the wriſt as poſſible; and I dare ſay, there is not a ſingle perſon, that would object to the operation being done *there*, notwithſtanding there are very many tendons, *thecæ*, and other inelaſtic ligaments. Great care muſt be taken in fitting the artificial leg to the ſtump, when it is amputated near the ancle, that the weight of the body, by partly reſting on the upper part of the *tibia* and *fibula*, may be ſupported by the upper part of the caſe of the wooden leg, while the ſides of the caſe aſſiſt in preventing the extremity of the ſtump deſcending ſo low as to riſque its being hurt in walking, &c.

The uſual aſſiſtance of bandage, to prevent the ſkin as well as the muſcles from retiring, is not to be neglected at the proper time, no more than medicine, whether anodyne, antiphlogiſtic, aperitive, or reſtorative, as occaſion may require. An *old ulcer* may ſometimes have deſtroyed the ligaments at the joint of the ancle, and made amputation of the leg neceſſary. If this ſhould be the caſe, and if, after the operation above recommended, the ſtump ſhould become foul, the ſore large, and attended with violent pain, I hope it will be remembered, that this is no uncommon thing, where amputation has been performed either above or below the knee, and in the uſual place; for we all know, that, when after habitual diſcharges of many years ſtanding, ulcers have been totally ſuppreſſed; that the acrimonious humour, driven from its uſual outlet, frequently fixes upon ſome other places: what wonder then, if, after amputation, made neceſſary by an ulcer, or under a bad habit of body, a flux of humour, derived to the ſtump, ſhould prevent its healing? We have all ſeen in this caſe, that, when the ſtump is almoſt healed, it will, in twenty-four hours, become greatly ſwelled, deep ſloughs be formed, and the ulcer, ſoon after, ſpread almoſt to a ſize, even larger than that of the ulcer, before the amputation.

THE difficulty of healing a ſore in the female ſex, whilſt they labour under a ſuppreſſion of their menſtrual flux, muſt have been obſerved by every ſurgeon in *Europe*; therefore, candor will require that queſtion to be aſked, before the difficulty of healing a ſtump, when amputation has been made near the ancle, be attributed merely to this new way of performing the operation; for I have repeatedly ſeen caſes of this kind foil the moſt experienced ſurgeons, till Nature was kind enough to carry off the impeding cauſe by her uſual outlet; and ſhould ſcrophulous, ſcorbutic, cancerous, or venereal leaven, give riſe to the complaint that ſeems *local*; unleſs the habit of body is corrected, very little is to be expected from ſurgery, but keeping the ſores clean.

THE general rule for placing the ſtump in bed, after amputation, is that it be as dependent as poſſible, that the matter may not lodge on the ſurface of the ſtump; and, if the operation be performed *below the knee*, to lay it in a bent poſture, as it muſt reſt on the wooden leg; but this direction is only to be obſerved, when we intend the patient ſhould bear on his knee: but, in caſe the knee is to preſerve its motion, the long ſtump may either lie ſlightly bent, or ſtraight, at times, as may be eaſieſt to the patient, who may change his poſture, and lie on his ſide or back, as he likes beſt.

IT is neceſſary that the nurſe, or ſome proper perſon, ſhould preſs, for ſome time, on the extremity of the ſtump, with the palm of the hand, to keep the dreſſings cloſe, and prevent the ſtump's bleeding. The ſurgeon, who has been uſed to amputations, will not be alarmed by a thin bloody diſcharge, which is uſually to be found on the under part of the ſtump, as it only oozes from the ſurface of the ſtump; but, in caſe any conſiderable branch of an artery, from the warmth of the bed, ſhould become dilated, the removal of the dreſſings is abſolutely neceſſary, and the bleeding veſſel is to be ſecured by ſurrounding its extremity with a ligature.

As ſoon as is convenient after the operation, I generally give a pretty large doſe of *opium*, and promote a gentle diaphoreſis, repeating the anodyne freely, as occaſion may require. As for the treatment of the patient, in caſe of a fever, redundancy of diſcharge, &c. that muſt be the ſame as after any other conſiderable operation.

THOUGH, in amputations of the thigh or arm, it is immaterial, whether we place ourſelves on the inſide or outſide of the limb, when the bone is to be ſawed through, yet it is of great conſequence, that we ſhould ſtand within ſide the limb, when the leg is to be taken off below the knee, or the arm below the cubit, that both the bones of theſe parts reſpectively may be ſawn together, to facilitate which, in the fore arm, the hand ſhould be turned prone. We muſt obſerve likewiſe, that, in amputations either of the fore arm, or of the leg, the interoſſeous ligament muſt be divided, and ſeparated from the bones. This is beſt effected by the crooked catlin, which will paſs round the bones, and between them, ſo as to clear the *perioſteum* before the bones are ſawed, which is not ſo well done by a ſtraight-edged knife.

It is an eſtabliſhed rule in ſurgery, to ſave as much of the hand or foot as we can, where amputation of the diſeaſed parts becomes neceſſary. The great advantage of this cannot have eſcaped the obſervation of any, who have ſeen the ravages of a *ſphacelus* on the feet,

from

from the ſeverity of froſt and ſnow, where poſſibly nothing of the *tarſus* has remained, but the *os calcis* and *aſtragalus*; yet, when the ſore has been healed, the perſon has walked tolerably well: but, ſhould it be neceſſary to amputate any part of the foot, the general rule of ſaving as much ſkin as poſſible muſt be obſerved: for, where Nature has made the ſeparation of the bones, as well as of the ſofter parts in a *ſphacelus*, there is often great difficulty in getting the ſore to heal, for want of a ſufficiency of ſkin; and, if it ſhould be cicatrized, the ſcar is large, and the ſkin ſo extreamly thin, that the leaſt friction from the ſhoe will occaſion a ſore, which frequently, after our beſt endeavours to cure it, requires the operation at laſt, which is both tedious and troubleſome, if the *metatarſal* bones are to be ſawed through their middle; for, after the circular inciſion is performed through the integuments and muſcles, and the neighbouring parts drawn up, the ſtraight-edged knife is to be paſſed between the toes, till it arrives at the circular inciſion. The crooked *biſtouri* will then clear the bones from their *perioſteum*, and the ſaw is to be applied as high as poſſible on each, to cut through the bone; but, in order to prevent the ſaw from hurting the fleſh or tendons of the *metatarſal* bone next to be taken off, it is adviſeable to paſs a piece of tin or ſheet lead between the bones, which may be bent to the ſhape of the part, and will become a proper defence againſt the teeth of the ſaw. The ſame proceſs of every part of the operation I have deſcribed muſt be repeated in taking off each bone that is to be removed.

I MUST here again inforce the neceſſity of ſaving as much ſkin as poſſible, to cover the bones, and of ſawing them as high as conveniently may be; but we are, on no account, to take them off at their connection with the bones of the *tarſus*, as the ligaments often ſlough, and at beſt make the cure tedious.

The fingers and toes are beſt taken off *in the articulation*; and ſo far am I from thinking, that great caution is neceſſary to avoid wounding the *cartilage* of the remaining bone, that I always pare it off; repeated trials having convinced me, that it ſhortens the cure conſiderably: for, though ſometimes the granulations may puſh through the cartilage in a ſhort time, yet I have known the cure retarded ſeveral weeks by waiting for the exfoliation.

In theſe amputations, it is beſt to cut through the integuments and tendons on the bone, which is to be taken off, in a circular manner, at a proper diſtance from the joint, in order to ſave ſkin enough, yet not ſo low as to embarraſs you. This inciſion is to be made with the point of your crooked *biſtouri*, to cut through the capſulary ligament of the joint; which you will more readily ſind, if, after your circular inciſion is made, you bend the finger towards the hollow of the hand; if the amputation is to take place at the articulation of the finger, with the *metacarpal* bone, then it will be adviſeable to divide the ſkin a little way up on each ſide of the joint, before the circular inciſion is made. In general, there will not be any neceſſity for making a ligature on the divided veſſels; but if, from obſtruction, they have been conſiderably dilated, and the bleeding does not ſtop by the application of lint and flour, with proper compreſſion by bandage, then the veſſels muſt be ſurrounded with a ligature.

I HAVE ſeen ſeveral inſtances, where the *os calcis* has been carious, and yet done well, without amputation of the foot. This bone is of a very looſe texture or ſpongy, as it is generally called: therefore, if proper openings are made, the diſeaſed parts of the bone will be thrown off, ſometimes in ſmall particles, by the ſubjacent granulations; and after that the matter becomes good, and the ſore heals.

I HAD a caſe of this kind once under my care, where the bone was very carious in the middle, between its anterior and poſterior extremities, and, as I perceived by introducing my probe, had nearly made its way through the oppoſite ſide. I then with an inſtrument made a perforation, and paſſed a piece of rag like a ſeton, and, by moving it daily, at the time of dreſſing the wound, all the crumblings of the bone were brought away, and the ulcer cloſed by ſuperficial dreſſings; but, in other inſtances, I have known the caries cut out, leaving a ſmall portion of the ſound part of the bone attached to the *tendo Achillis*: the tendon was properly kept down by a bandage; to effect which, the knee was bent, and the foot extended; and this treatment was attended with ſucceſs. I remember indeed a locked jaw happening in conſequence of this operation, and the patient dying; but I am of opinion, that it was in ſome meaſure brought on by keeping the tendinous parts on the ſtretch, and not duely conſidering the moſt favourable poſture for the limb, after the ligamentous fibres had been hurt in the operation.

A CARIES in the articulation of the ſhoulder has, till within a very few years, been looked on as an incurable caſe; and it was formerly the cuſtom to leave the patient to the mercy of the diſeaſe, till, ſooner or later, after his ſuffering the moſt excruciating pain, during the formation of matter, by repeated abſceſſes, and his daily ſinking under the immenſe diſcharge, death put an end to his miſery.

WE find a very remarkable caſe related by *Ambroſe Parè*, of a ſoldier, of whom, in conſequence of a gun-ſhot wound at the wriſt, the arm mortified to the elbow. The patient being given up by thoſe who had the firſt care of him, *Parè* very humanely, on the entreaties of the poor man's friends, though in ſo deſperate a ſtate as they had deſcribed, promiſed to give him all the aſſiſtance in his power. Though the effects of the inflammation were propagated even to the middle of the *thorax*, yet the mortification, to all appearance, ſeemed to terminate below the elbow. *Parè* therefore, on reading *Hippocrates*, being convinced that there was not the leaſt danger of any bad conſequence from the operation he meditated to perform, except of a *ſyncope* from the pain in cutting through the tendons and ligaments, removed the ſphacelated arm, by making an amputation in the joint of the elbow. He made uſe of the actual cautery to reſtrain the hemorrhage. The man, ſoon after the operation, was ſeized with convulſions, hiccoughs, &c.

and his jaw became fixed, or *locked*, as it is generally called; but theſe ſymptoms he attributed to the inclemency of the weather, and the bad lodging his patient had. To get rid of the ſpaſms, he wrapped up the poor man in a ſheet, but firſt rubbed his neck and the whole ſpine with a ſort of nervous liniment, aſſiſted by the heat of chafing-diſhes of coals; then laid him in a hole dug in the ſtable, and covered him with hot horſe-dung, up to his neck, for three days. A gentle purging then came on, followed by a plentiful diaphoreſis, and the patient then began to move his lower jaw, and open his mouth. However, *Parè* did not chuſe to truſt to this method ſolely, but made uſe of an inſtrument to force the jaw ſtill further open. He then went to work again upon his limb, or rather ſtump, and burnt the end of the bone with a hot iron, in order to dry up the *ſanies*. But what *Parè* looked upon as very remarkable, and which I really think ſo, if true, was, that the patient received pleaſure from each application of the actual cautery; and he had remarked in the hoſpital, that the patients often expreſſed, that they felt a ſort of titillating kind of itching throughout the whole length of the bone, when the cautery was applied, by the diffuſion of the heat. After various exfoliations of the bone, the patient got well. He therefore adviſes young ſurgeons never to give up any caſe as incurable; for, as in nature, ſo in diſeaſes, very extraordinary things happen.

If one did not ſuppoſe, that, from the uſe of the actual cautery, moſt of the alarming ſymptoms were brought on, that followed this method of amputating in the joint, there would not be any great inducement to a ſurgeon to perform it a ſecond time in this manner. Nevertheleſs, *Le Dran* has ventured to propoſe this method of operating in removing the arm from its articulation with the *ſcapula*, when it may be thought neceſſary, and adds, he did it once with ſucceſs. *Heiſter* and *Sharpe* deſcribe the operation; but neither of them, I think, ever did it on a living ſubject. As ſeveral caſes have offered, in which I have performed it with ſucceſs, I ſhall lay before the public the method I purſued from the firſt to the laſt time: though I muſt acknowledge, I had but little encouragement to do it at firſt, from thoſe who had ſeen it performed repeatedly in the army, where the joint of the ſhoulder had been greatly injured by gun ſhot, and amputation at the joint was the only chance for preſerving life: for, though the operations were ſeemingly well performed, and every thing went on, to all appearance well, for near three weeks, yet, I am told, the patients all died. This was very diſcouraging, as it muſt be ſuppoſed, that there could be nothing to contend with in thoſe caſes, but the ſymptomatic fever, as moſt likely the patients were in perfect health before the accident, which required

quired the operation. However, ſoon after I had heard this account, I was obliged to take off an arm ſo very high, that nothing remained of the bone but its head in the *acetabulum*. The caſe being very remarkable, I ſhall inſert it.

A POOR woman, between forty and fifty, was brought into *St. George*'s hoſpital, with a ſimple fracture about the middle of the *os brachii*. The parts near it being greatly ſwelled when I ſaw it, the reduction was poſtponed till the tumour ſhould ſubſide; but, at the end of ten or twelve days, though the ſwelling above the fracture was not abated much by the uſe of the ſtale-beer poultice, &c. yet, as the poor woman made herſelf uneaſy, on account of its not being ſet, a gentle extenſion was made, the ends of the bone applied to each other, and retained in their ſituation by bandage. At the uſual time, the applications were removed, but the *callus* was not in the leaſt formed. The roller was again applied, though very lightly; as the ſwelling above the fracture was rather encreaſed, and ſhe complained of ſo great pain, with tenſion about the *deltoid* muſcle, that I thought it adviſeable to take off all bandage, and place the limb in a poultice. Some few days afterwards, on examining the ſwelling, I thought I felt a fluctuation.

The gentlemen preſent being of the ſame opinion, an inciſion was made through the *deltoid* muſcle, and a torrent of blood iſſued out ſo faſt, that it ſoon convinced us of the cauſe of the tumour, and that the only chance for recovery was amputation. The inſtruments, &c. were brought down as ſoon as poſſible, during which time one of the pupils ſtopped the effuſion, by putting his fingers, armed with lint, into the inciſion. The veſſels being compreſſed in the *axilla*, I began my inciſion of the integuments, about three inches below the articulation, and over the middle of the anterior part of the *deltoid* muſcle, but rather internally. This inciſion was continued in a circular manner towards the outſide of the arm, and underneath, terminating oppoſite to the point where I began, and made almoſt two thirds of the circle. I then had the ſkin drawn up, and I cut through the *deltoid* muſcle in the ſame manner. The grumous blood being cleared away, the veſſels were ſecured by paſſing an eyed probe armed with a ſtrong ligature round them. Another ligature was made at the diſtance of half an inch from the former, for greater ſecurity. The circular inciſion, both of ſkin and muſcles, was then compleated, and the arm came off, to my great aſtoniſhment, as I did not perceive the leaſt bony ſubſtance by my knife. I paſſed up my finger towards the articulation, and, inſtead of bone, found a ſort of ſarcomatous ſubſtance, in which were a great many little pieces of bone like ſaw-duſt. As much as poſſible of this was taken away; but, as there were ſeveral points of bone that remained adhering to this ſubſtance, that had inſinuated itſelf into the interſtices of the muſcles, in order to give it an opportunity of being diſcharged with the matter, I filled up the cavity, where the bone ſhould have been, with hard doſſils of lint, and continued dreſſing to the bottom, till all the bony particles were diſcharged, and the granulations had begun to fill up the cavity. Every thing anſwered our wiſhes for fourteen or fifteen days, and the part was healing as faſt as poſſible; but a putrid fever came on, which ſoon altered the appearance of the ſtump, the muſcles becoming extreamly flabby, and of a pale hue, the diſcharge encreaſed, and grew very thin and acrimonious, and the woman, being otherwiſe of a bad habit of body, died. She complained of her throat for ſeveral days before her death; but, on inſpection, not the leaſt diſorder could be obſerved in that part.

On opening the body, we found a ſlight adheſion of the lungs on the left ſide, but pretty ſtrong on the right, with water in both cavities. There was not the leaſt appearance of bone below the inſertion of the capſulary ligament; the head of the bone within the joint, and the joint itſelf, were in a ſound ſtate.

From the above caſe, I was fully convinced, that making the ligature on the artery, as high as was neceſſary for amputating in the joint of the ſhoulder, was very practicable; and there was every appearance of the poor woman's being perfectly cured in a very ſhort time, had not the putrid fever carried her off, as it did many others at that time in the hoſpital.

This determined me to undertake the operation of amputating in the joint of the ſhoulder the firſt caſe that ſhould offer, and which might require it: ſince when I have done it ſeveral times, and always with ſucceſs: but, before I explain the operation, it will be neceſſary to deſcribe the articulation of the ſhoulder; the courſe of the blood veſſels, as they paſs out of the *thorax*, and become ſubclavian, &c. to the cubit; the ſeveral nerves accompanying thoſe veſſels; the origin and inſertions of the muſcles terminating in the upper part of the *os brachiale*, and which muſt neceſſarily be divided in this operation, ſhould likewiſe be perfectly underſtood by every one, who attempts this amputation at the joint of the ſhoulder.

I MUST, previouſly to the deſcription of the parts belonging to the joint of the ſhoulder, obſerve that, in the following pages, I have not uſed the name of *humerus*, to ſignify the *long bone* of the arm, concerned in the compoſition of the joint of the ſhoulder; but, I hope with greater propriety, have called it *os brachii*, or *brachiale*, according to ſome anatomical writers.

THE anterior part of the *ſcapula*, and the upper extremity of the *os brachiale*, form the ſhoulder in moſt animals, where progreſſive motion only is neceſſary; but, where the quantity of motion is to be encreaſed, and the lower extremity of the *os brachii* capable of deſcribing a circle, that can only be effected by the *ſcapula*'s being kept at due diſtance from the trunk of the body, as is obſervable in all brutes of the ape kind, as well as in the human ſpecies: therefore, they are furniſhed with clavicles, which are wanting in moſt quadrupedes. This rotatory motion is performed by the *muſculi levatores*, *abductores*, *depreſſores*, and *adductores* of the *os brachii* ſucceeding each other in their reſpective motions with great quickneſs: therefore, their levers are very ſhort, and moſt of their tendons implanted into the *cervix* of the brachial bone; but, where force is wanted more than velocity, there we find the tendon is fixed further from the center of motion.

In order to our better underſtanding the method I propoſe, I ſhall deſcribe the parts as they offer themſelves in the operation. The external integuments being removed from the ſhoulder, and the upper and anterior part of the *os brachiale*, the *deltoid* muſcle, ſo called from its reſembling in ſhape the *Greek* letter Δ inverted, preſents itſelf. It takes its riſe from the inferior edge of the ſpine of the *ſcapula*, the anterior part of the *acromion*, and part of the clavicle; it then paſſes over the articulation, and in its deſcent the different *radii* from its origination ſeem to meet in a middle line, ſo as to give a penniform appearance, before they form the tendon or inferior angle, moſt of whoſe fibres pierce the *perioſteum*, and are loſt in the ſubſtance of the *os brachii*, near its middle, which is ever rough in that part, if not ſcraped ſmooth by the ſkeleton-makers. Some of the fibres of the tendons of this muſcle are ſent off, and intimately blended with the imbanding *faſcia* of the muſcles of the arm, while ſome others are loſt in the tendino-carnous origin of the *brachialis.*

THE integuments being removed towards the *thorax*, on the internal ſide of the *os brachii*, we obſerve a broad flat tendon, making its way under the *deltoid* muſcle to its inſertion in that bone, above the termination of the laſt-named muſcle. If we trace this tendon towards the *ſternon*, we find it belongs to the *pectoralis major*, whoſe fleſhy fibres diverge like the *radii* of a circle, and are affixed to part of the clavicle, to the *ſternon*, to the true ribs, and ſometimes to the upper falſe ribs. It likewiſe has a *faſciculus* of fibres, that are loſt in the upper portion of the *rectus abdominis*, and ſometimes a few fibres are interwoven with the *obliquus externus.* The *radii* from the different originations in their progreſs to form the tendon, approach each other; but, previous to their becoming the broad flat tendon, ſend off ſome tendinous *faſciculi* of fibres, which are interwoven with the ligamentous *faſcia* of the muſcles of the arm. This muſcle and the *deltoid*, at their attachment to the *clavicula*, ſeem as one muſcle, being very nearly in contact, and what keeps them diſtinct is only ſome of the adipoſo-cellular ſubſtance, where they give paſſage to the returning veſſel, called by the ancients *vena cephalica*.

THE pectoral muſcle being cut through, where it begins to form the tendon, and the muſcular part freed from the *thorax*, and turned back on the oppoſite ſide of the cheſt, we diſcover the upper part of the *biceps cubiti flexor*, *brachii elevator & adductor*, *& radii ſupinator*. One of the heads is affixed in common with the *coraco-brachialis* to the *proceſſus coracoides ſcapulæ*; the other takes its riſe from the *cervix ſcapulæ*, near the laſt-named proceſs; then, piercing the burſal ligament, is lodged and confined in a groove excavated in the head of the *os brachiale*; then paſſing out of the joint, is contained in a *theca*, and unites with the other head: theſe, after their union, form a fleſhy belly, which terminates in a tendon, implanted into a tuberoſity of the *radius.*

If the belly of the *biceps* is cut through, and the upper half turned upon the ſhoulder, while the lower half is likewiſe cleared from its connection with the neighbouring parts, and turned downwards on the fore arm, we diſcover the large blood veſſels and nerves deſcending from the *axilla*, on the inſide of the arm, and now called *brachial*; they paſs over the muſcle next to be deſcribed, called *coraco-brachialis*, whoſe name expreſſes its origin and inſertion; for it takes its riſe from the *proceſſus coracoides*, in common with one of the heads of the *biceps*, with the fibres of which its fibres are ſo intimately blended, that it is not always eaſy to ſeparate them without wounding the one or the other. It then deſcends to its termination in the middle of the brachial bone.

The blood veſſels, nerves, and the laſt muſcle, being lifted up a little, we find another flat tendon ſomething ſimilar to that of the *pectoralis major*, which is the termination of the *latiſſimus dorſi*. The propriety of this name will be eaſily allowed, as the pair of that name cover great part of the back and loins. As I generally call the parts, which are in a ſtate of reſt, when the muſcle acts, and to which it is any ways affixed, the part from whence the muſcle takes its origin, and the part moved by the implantation of the other extremity of the muſcle, its inſertion, I accordingly ſay, the *latiſſimus dorſi* takes its riſe by a flat tendinous *faſcia*, from the poſterior part of the ſpine of the *ilium*, the ſpinal proceſſes of the *os ſacrum*, of the *vertebræ* of the loins, and of the ſeven or eight inferior *vertebræ* of the back; in its way to the *axilla*, we find ſome of its fibres affixed to three or four of the loweſt falſe ribs, and ſometimes a few fibres, are attached to the inferior *coſta* of the *ſcapula*. Soon after this, the fibres are brought into a very narrow compaſs, and at laſt are ſo cloſely applied to each other, as to become a broad flat tendon, which is inſerted into the *os brachiale*, nearer to its head than that of the *pectoralis major*.

IMMEDIATELY behind this, and not much higher on the bone, is the termination of the tendon of the *teres major*, whoſe other extremity is affixed to the inferior *coſta*, as well as to the lower angle of the *ſcapula*.

I MUST now obſerve, that the intermediate ſpace in the inferior part of the ſhoulder, between the tendons of the *pectoralis major* and the *latiſſimus dorſi*, as well as the *teres major*, is called the *axilla*, in which are lodged ſeveral glands in a looſe, adipoſe cellular ſubſtance, and there alſo the blood veſſels paſs free from compreſſion.

IF we ſeparate the *deltoid* muſcle from its inſertion, and turn it back on the ſhoulder, we ſhall diſcover the implantation of the *ſupra ſpinatus* and *infra ſpinatus*, into the anterior part of the head of the *os brachii.* They both of them derive their origin from the baſe of the *ſcapula*, the one above, the other below its ſpine, and in their progreſs the fibres of each muſcle run cloſer together, and then paſs over the articulation to be inſerted immediately into the head of the *os brachii.*

The external and inferior part, the remainder of the head of the *os brachii*, is covered by the terminations or inſertions of the *teres minor* and *ſubſcapularis.* The *teres minor* ariſes from the internal *labium* of the *coſta inferior* of the *ſcapula*; the other from the whole baſe of the *ſcapula*; from whence it paſſes, poſſeſſing the whole concave part of the *ſcapula*, and is inſerted with the former into the poſterior part of the head of the *os brachiale.*

As one of the heads of the *triceps cubiti exterior*, by *Winſlow* called *anconæus major*, muſt be divided in this operation, I ſhall only mention, that it takes its origin from the *cervix ſcapulæ*, and a ſmall part of the inferior *coſta*, near to the neck of the *ſcapula*, from thence paſſing between the *teres minor* and *ſubſcapularis*, it marches over the articulation, then joins with the two other heads, and deſcends to its inſertion in the *olecranon*.

THE blood veſſels and nerves being now laid bare, and in their natural ſituation, we muſt obſerve firſt, that the ſubclavian artery takes it riſe within the *thorax*, from the curvature of the *aorta*, and aſcends above the firſt rib, when paſſing between the inſertions of the *ſcaleni* muſcles, it deſcends under the *clavicula* into the *axilla*, where it takes the name of *axillaris*, and immediately ſends off four or five principal branches, the firſt of which is called *arteria thoracica ſuperior*, and furniſhes the pectoral muſcle with blood for its motion and nutrition; it likewiſe gives veſſels to the *ſerratus major*, *ſubclavius*, *latiſſimus dorſi*, and the upper parts of the *biceps* and *coraco brachialis*

chialis muſcles, and from the ſuperior *thoracic* artery a branch is generally ſent off, which forms an *anaſtomoſis* with the *radial* artery.

THE inferior *thoracic* paſſes backward on the inferior *coſta* of the *ſcapula*, and its ramifications terminate in the *teres major* & *minor*, *latiſſimus dorſi*, *ſubſcapularis*, and *ſerratus major.*

THE *ſcapulary* arteries are two in each arm; one external, the other internal.

THE *external ſcapulary artery* ſends branches to the *teres major* & *minor*, and *infra ſpinatus*; then paſſing over the *cervix ſcapulæ* in the notch formed by it and the *proceſſus acromion*, it furniſhes veſſels to the *ſupra ſpinatus*, and to the articulation of the ſhoulder.

THE *internal ſcapulary artery*, when it branches off from the *axillary artery*, runs backward, to furniſh veſſels to the *ſubſcapularis*, *teres major*, *ſupra ſpinatus*, and the upper part of the *triceps*; it likewiſe ſends veſſels to the axillary glands.

THE next branch I term *articularis*, from the number of ramifications ſent from it to the capſular ligament, and into the upper part of the *os brachii* below its head, which enter by ſeveral *foraminulæ*. This veſſel has an *anaſtomoſis* with the *ſcapulary* artery; ſome other branches are ſent off to the upper part of the *triceps*. After the *axillary* artery has paſſed below the tendon of the pectoral muſcle, the principal trunk is then called *brachial*, which marches over the *coraco-brachialis*, and one of the heads of the *triceps*, continuing its courſe on the inſide of the arm, by the inner edge of the *biceps*, in its way to the cubit. The *brachial* artery is very near the ſurface in its upper part, having little other covering than the common integuments. I ſhall not be any ways particular in mentioning the different diſtributions of the *rami* of the *brachial* nerves, and only ſay, that the *plexus* receives different appellations, according to the parts on which the branches are ſpent, ſuch as *cutanei*, *articulares*, *cubitales*, *&c.*

THE muſcles, nerves, and blood veſſels, about the joint of the ſhoulder, being removed, the burſal or capſular ligament becomes apparent; its upper attachment is round the *cervix* of the *acetabulum ſcapulæ*, and its lower is to the neck of the *os brachii*, a little below the cartilaginous ſurface of its head, except between the tubercles, where one of the tendons of the *biceps* paſſes through the articulation; there, indeed, the ligament ſeems to form a *theca* to that tendon. The chief uſe of this burſal ligament is to aſſiſt in the ſecretion of the *ſynovia*, to contain it, and equally diſtribute it to the heads of the bones contained within its cavity, as well as ſupply a proper quantity of

the

the mucilage to the tendon contained within the *theca.*

The burſal ligament being opened, we diſcover the head of the *os brachii* and the *acetabulum ſcapulæ*, both of them furniſhed with cartilaginous ſurfaces, to facilitate their motions on each other; to which, as well as to prevent their attrition, the *ſynovia* is ſubſervient.

If the perſon, who is to perform this operation, will make himſelf perfectly acquainted with the muſcles, nerves, blood veſſels, and other parts relating to the ſhoulder, in the order I have deſcribed them, he will be convinced, how greatly it will facilitate matters, both in reſpect to the patient and himſelf during the performance; and I do firmly believe, that the ſucceſs depends greatly on the preſerving of the muſcular veſſels, which ſurround the joint, and are greatly expoſed to the knife in the ways of performance, that have hitherto been laid down by chirurgical writers, who have wanted experience to refute their theoretical deſcriptions; as I am convinced, that the remarks I have made during each operation of this kind which I have performed, and ſome particular ſymptoms in conſequence of it during the cure, have enabled me to point out ſeveral improvements for the advantage of the patient, by rendering it leſs hazardous, as well as leſs painful. I do not pretend, that it is incapable of further improvement; but I muſt ſay, I ſhall not expect it but from thoſe, who may have frequent opportunities of performing it with ſucceſs: but, in order that ſurgeons may determine for themſelves, I will lay down the different methods that have hitherto been propoſed by different profeſſors.

AND firſt, Mr. *Le Dran* tells us, that thoſe, who have either written on this operation, or have performed it, being greatly ſolicitous to prevent an hemorrhage from the axillary artery, when divided, paſſed a crooked needle, armed with a ſtrong ligature, two or three inches below the *axilla*, between the *os brachiale* and the large blood veſſels. By this means, when the ligature was made, they not only included the muſcles and veſſels, but the integuments, and would not hazard the ligature's tearing its way out; but, before the firſt knot was made, a large compreſs of cloth was laid on the ſkin, under the intended knot of the ligature; nevertheleſs, he ſays, after the limb is amputated, they make a ſecond ligature on the veſſels in the *axilla*. He very juſtly condemns this method, as both tedious and cruel, as well as unneceſſary to prevent the hemorrhage; for, by finiſhing the inciſion at the part where the veſſels are ſituated, they may, when divided, immediately be laid hold on with the fingers, and a ligature made on them.

GARENGEOT deſcribes this operation nearly in the ſame manner as *Le Dran*, the father, but mentions ſome improvements, as he thinks, by recommending a *crooked* needle, that cuts on its ſides as well as its point, to paſs between the bone and veſſels; but ſecures the veſſels exactly in the ſame manner as Mr. *Le Dran*, by incloſing the integuments, &c. within the ligature. He likewiſe makes the tranſverſe inciſion of the integuments and *deltoid* muſcle farther from the articulation, about the diſtance of two or three fingers breadth from the *acromion*, and at the ſame time that an aſſiſtant pulls up the divided parts towards the ſhoulder, he makes a triangular flap of the *deltoid*; which is *raiſed up*, till the *capſula* of the joint is totally divided, that the head of the bone may be diſlodged; the ſecond ligature being made on the veſſels in the *axilla*, and the integuments and muſcles cut through entirely round the joint, and the arm removed, the point of the flap is then permitted to fall into the cavity of the *axilla.*

Monsieur de la Faye, in the Memoirs of the Royal Academy of Surgery at *Paris*, improves on his predeceſſors, and makes the tranſverſe inciſion of the *deltoid* muſcle lower down on the bone, to the diſtance of three or four fingers breadth from the *acromion.* He then directs two lateral inciſions to be made, one on each ſide the *deltoid*, according to the length of that muſcle, which inciſions are to terminate in the tranſverſe or firſt inciſion, ſo that a ſort of *lambeau* or flap is produced: he then cuts through the upper parts of the *biceps* muſcle, and the ligament of the joint, and diſlodges the head of the *os brachii* from the *acetabulum ſcapulæ*, cuts cloſe by the inner ſide of the bone, to avoid wounding the veſſels; the back of the blade being next to the artery, he purſues his amputation, by cutting through the integuments and muſcles in the *axilla*, quite to the external part of the ſhoulder, where the lateral inciſion terminated. He then makes a ligature on the artery *as high in the axilla as he poſſibly can*, and finiſhes the operation by cutting through the remaining parts, about half an inch below the ligature on the veſſels, by which the arm is removed from the ſhoulder. The flap is then brought down into the *axilla*, and has only, he ſays, the appearance of a ſemicircular wound, out of which the ends of the ligatures made on the artery hang. He is of opinion, that he has made very great improvements; firſt, as he does not make a ligature on the veſſels, till almoſt the very laſt part of the operation: ſecondly, as the baſis of his flap is uppermoſt, whereas *Garangeot*'s was towards the *axilla*; therefore, he has a more dependent drain for the matter, and, by having more of the *deltoid* muſcle preſerved, it is better furniſhed with veſſels, for the union of the *lambeau*, or flap, with the other fleſh, even what granulates from the *acetabulum* of the *ſcapula.*

* Mr. *Sharpe,* in his Treatiſe of the Operations of Surgery, ſays he has heard of this operation having been done once; but, tho' it had not ever been performed, that it was certainly practicable by the ſucceſs that attended the caſe of a poor miller, whoſe arm, with the *ſcapula*, was torn from his body by a rope, which was accidentally twiſted round his wriſt, and ſuddenly drawn up by the mill. It was very remarkable, that, on the man's fainting, the bleeding ceaſed, and the man never bled afreſh, though nothing but lint and turpentine were applied to the great veſſels in the *axilla*, and the man perfectly recovered in a few weeks. Mr. *Sharpe* therefore propoſes, in caſe of neceſſity, to amputate at the articulation of the ſhoulder, and to do it in the following manner.

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* *Sharpe*'s Operations of Surgery, page 221.

"THE patient's arm being held horizontally, make an inciſion through the *membrana adipoſa*, from the upper part of the ſhoulder acroſs the pectoral muſcle, down to the arm-pit; then, turning the edge of the knife upwards, divide that muſcle with part of the *deltoid*. All which may be done without danger of wounding the great veſſels, which will become expoſed by theſe openings; if they be not, cut ſtill more of the *deltoid* muſcle, and carry the arm backwards: then, with a ſtrong ligature having tied the artery and vein, purſue the circular inciſion through the joint, and carefully divide the veſſels at a conſiderable diſtance below the ligature: the other ſmall veſſels are to be ſtopped as in other caſes.

"IN doing this operation, regard ſhould be had to the ſaving as much ſkin as poſſible, and to the ſituation of the *proceſſus acromion*, which projecting conſiderably beyond the joint, an unwary operator would be apt to cut upon."

Heister, who in his Surgery deſcribes the operation from *Le Dran* ſenior, places the patient in a chair, with his arm extended, then makes the ligature on the artery, by paſſing the needle between the bone and veſſels, and including the integuments, &c. in the nooſe; but, in caſe of any difficulty of finding the brachial artery from the ſwelling of the limb, it is then, he ſays, adviſeable to cut through the integuments cloſe to the bone, according to its length, both on its anterior and poſterior part; with your finger you are to find out the artery, and then paſs your needle, as before directed, to make the ligature on the veſſels. He ſays, probably ſome large veſſels may nevertheleſs be wounded in the operation: if ſo, you are firſt to reſtrain the bleeding, by ligatures made on the veſſels, with a common crooked needle, before you proceed further. He finiſhes the reſt of the operation according to *Le Dran*, only he recommends, in the dreſſing up of the ſtump, not to put any lint or compreſſes immediately on the bone or artery, but on the outſide of the flap; by which he expects an union of the parts ſooner by the preſſure, than if lint was intermediate. *Garengeot* ſays, in a ſecond edition of his Chirurgical Operations, that the perſon, on whom *Le Dran*, ſenior, performed the operation, died ſix months after of a *plethora*. *Heiſter*'s criticiſm on *Garengeot* is rather unjuſt*, as he certainly means an abſceſs within the articulation, which generally will be attended with caries, and, if ſo, moſt probably would require the operation.

LE DRAN, junior, ſeats the patient in a chair, the back of which is lower than the arm-pit; and, in order to prevent his raiſing himſelf up, which from the pain he would be very apt to attempt, ſays, I paſs a cloth over his belly, and tie it behind the back of the chair. An aſſiſtant then holding the arm firm with the elbow, four fingers breadth from the body, I take a long biſtory, or inſtead of that a razor made faſt in its ſcale, and make a tranſverſe inciſion through the greateſt portion of the *deltoid* muſcle, at its upper part, and a little lower than where the *capſula* of the joint is connected to the *humerus*. This done, I immediately direct that part of the muſcle which is left, to be raiſed by an aſſiſtant, and, with a ſecond inciſion, divide part of the *capſula* tranſverſely, and likewiſe the tendon of the *muſculus ſupraſpinatus*, which is inſerted there. After this, introducing my finger to diſcover the joint, I take another biſtory fixed in its handle and blunt, and I finiſh the inciſion of the *capſula*, cutting from within outwards, and at the ſame time divide the tendons that paſs over it, and alſo the tendon of the *latiſſimus dorſi*. Having proceeded thus far, I direct the aſſiſtant, who ſupports the arm, to puſh the *humerus* upwards, and diſlocate it, which is eaſily done, as it is now no longer confined by the *capſula*. Then, ſliding the edge of my knife between the head of the bone, and the *glenoide* cavity, I finiſh the inciſion on the inſide of the arm, directing the edge of the biſtory between the bone and the veſſels, as far as two or three fingers breadth below the arm-pit. There I finiſh the ſeparation of the fleſh, leaving only a ſmall flap of it, in which the artery lies.

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* *Vide* Heiſter, *tom.* I. *p.* 514. *l.* 5. Garengeot *etiam docet, hanc operationem quoque in abſceſſu juxta articulum humeri inſtituendam eſſe; utrum autem propter ſimplicem aliquem abſceſſum, uſque adeo periculoſa ac difficilis ſuſcipi operatio debeat, hoc prudentioribus chirurgis definiendum committo.*

THE arm being ſeparated, we diſcover the trunk of the artery, from whence the blood proceeds, which I immediately take hold of with the fore finger and thumb of my left hand, and make a ſtrong ligature upon it under the arm-pit. If the flap is too long, I cut part of it off below the ligature, and, if there be any other branch of an artery that bleeds, I likewiſe tie that.

THIS operation being finiſhed, I clean the circumference of the wound, and bringing the flaps together, as near as poſſible, I ſecure them in that ſituation with ſtraps of ſticking-plaiſter. In order to procure the reunion of the greateſt part of the fleſh, the *glenoide* cavity of the *capſula* ſhould be dreſſed with dry lint, and in time it will produce new fleſh, which will unite with the adjacent parts. The reſt of the wound is likewiſe to be dreſſed with dry lint, and the whole kept on with a proper bandage, applying the ſame dreſſings afterwards as are uſual in other operations.

IT may at firſt appear proper, perhaps, to leave flaps of a ſufficient length to bring the lips of the wound exactly together, and procure a ſpeedy reunion of them, as in the operation before deſcribed ;

deſcribed; but, in this caſe, that method is impracticable; for, if the fleſh was to cover the *glenoide* cavity, it could not unite with it, as only parts that are recently divided can be reunited, according to the firſt intention. For this reaſon, therefore, only ſo much of the flap muſt be left on as is neceſſary to procure the reunion of thoſe parts of the fleſh, which ſtill bleed, bringing them towards each other, and ſecuring them in that ſituation, as has been before directed.

THERE is not an operation in ſurgery ſo diſagreeable to the ſurgeon, as that of amputating the arm in the joint of the ſhoulder, as it is tedious and difficult to him, and much more painful to the patient, than the amputation of any other part, the nerves not being compreſſed by the *tourniquet*, as in other caſes; which makes the parts conſiderably leſs ſenſible of the knife. Whoever then can render this operation more ſimple, and leſs painful to the patient, deſerves the thanks of the public in general, and of the profeſſion of ſurgery in particular. In order to effect this, I ſhall offer my ſentiments on the methods, which have hitherto been delivered to us by different authors, and then communicate the remarks I have made, from time to time, on the different methods I purſued in each ſucceeding operation, as I diſcovered inconveniencies to ariſe; and I flatter myſelf, that the operation, as I performed it the two laſt times, will be found preferable to any other method we are at preſent acquainted with.

I SHALL not pretend to determine, whether *Le Dran* ſenior, or *Morand* ſenior, was the inventor of this operation; but muſt ſay, the method of ecuring the veſſels from bleeding, propoſed by them, and followed by *Garengeot* and *Heiſter*, is cruel; as, much unneceſſary pain is given in paſſing the firſt ligature, which not only includes the blood-veſſels and nerves, but the muſcles and integuments. The conſequences of the *axillary* artery being wounded, they apprehended muſt be fatal, which they grounded on repeated obſervations, *viz.* that any conſiderable artery being wounded, the patient died almoſt immediately, from the quantity of blood ſuddenly loſt.

MONSIEUR DE LA FAYE's criticiſms on his predeceſſors are juſt, particularly his remark on the flap of the ſkin in *Garengeot*'s operation, as having its broadeſt part at the *axilla*, and conſequently not ſo advantageous for the exit of the matter, as where the baſis of the flap is uppermoſt, by being left undivided at the top of the ſhoulder; and his exploding the practice of the ligature on the blood-veſſels, muſcles, and integuments, &c. is highly commendable: but thoſe, who have deſcribed the operation, ſo as to form the *lambeau* or flap by the *deltoid* muſcle, ſeem to expect what cannot happen, *viz.*

agglutination of the *lambeau* with the ſubjacent parts by the firſt intention, as it is called; for, as *Le Dran* junior obſerves, the origin of the *deltoid* muſcle from the *acromion* will keep it at ſo great a diſtance from the *acetabulum ſcapulæ*, that a union is impoſſible, till granulations are thrown out from the *glenoide* cavity and parts adjacent. *Heiſter* ſeems to think, that his method will effect this: he directs the lint and compreſs to be applied *externally*, which, he flatters himſelf, will keep the bleeding parts in contact; but he has forgot, that in caſe the head of the *ſcapula* is ſound, that the cartilage will prevent the union, till it is exfoliated; and whenever it proves carious, till the granulations ariſe by the caries being thrown off, it will equally prove an obſtacle to the union of the flap with the ſubjacent parts. The including the nerve in the ligature with the artery produces violent pain, ſpaſms, and a ſymptomatic fever. *The nerves* *ſhould be cut off as high as poſſible*; for, in the ſecond perſon, on whom I performed this operation, the nerves were left pretty long, that is, equal in length with the artery; the conſequence of which was, that ſhe complained of the moſt excruciating pain from the air at every dreſſing; and what is moſt remarkable, is, that, though the ſkin is ſtretched over, and the whole perfectly healed, yet the ſlighteſt touch on the *apices* of the nerves produces violent pain, even at this time.

THE blood-veſſels ſhould be left *very long*, contrary to all former opinions; for, by endeavouring to tie them very high in the *axilla*, you make the ligature above the nutrient veſſels of moſt of the muſcles of the ſhoulder, that remain after removing of the arm; and, though at firſt they may hang equal with the ſurface of the wound, yet, by their elaſticity, they ſoon retire within the fleſh, which I imagine ſuppreſſed the hemorrhage in the man's arm, which was torn off by the mill, as mentioned by Mr. *Sharp* *. *Le Dran*, both father and ſon, and I think Mr. *Sharp*, by their deſcriptions, ſeem to avoid making the *lambeau* or flap, poſſibly from having ſeen the ill ſucceſs of it below the knee: but, in this caſe, every poſſible advantage may be expected of ſhortening the cure from it, if the operation is *properly* done.

MR. LE DRAN, junior, we find, lets the artery remain undivided till after the bone is diſlodged from the *acetabulum*, and all the muſcles on the ſuperior, poſterior, and external parts of the arm, are divided. He then finiſhes his amputation on the internal part, by which he divides the artery, and relies on his taking hold of it in time with the finger and thumb of his left hand, and then ſecuring it from bleeding, by tying a ligature round the extremity of the veſſel *high up in the arm-pit*; and in caſe the *flap* is too long below the ligature, he cuts that off afterwards. He means *the flap*, on which the veſſels remain after the bone is diſlodged, and the reſt of the muſcles cut through, that were neceſſarily divided in the former part of the operation.

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* *Sharp*'s Operations of Surgery, p. 221, firſt edit.

EVERY author adviſes the patient to be placed in a chair. I have done the operation with the patient ſitting on a chair, and at other times when laid on a table; but I prefer the latter, becauſe the patient is better ſecured from moving by the aſſiſtants. The proper *apparatus* for the operation, as well as the neceſſary dreſſings to be applied afterwards, and the bandage for retaining them, being prepared, I place my patient, reſting on his ſound ſide, on a table of a proper height, covered with a blanket; he is to be placed with ſome little degree of obliquity, that there may be room for the hand and knife of the operator to move freely on all ſides, without any obſtruction from the table during the operation. I then order an aſſiſtant to preſs with his fingers on the *ſubclavian* artery, as it paſſes thro' the *ſcaleni* muſcles, ſo as the courſe of the blood may be prevented by the reſiſtance of the upper ſurface of the firſt rib. To be aſſured of this, I repeatedly feel the patient's pulſe, directing my aſſiſtant, during that time, to make the preſſure on the veſſel, then to take it off; and in caſe I find that he is capable of ſtopping the courſe of the blood through that veſſel on being deſired, I prefer this method to any *tourniquet* that can be contrived.

The patient then being properly placed and ſecured by my aſſiſtants, and preſſure made on the artery above the *clavicle*, I begin my inciſion on the inſide of the arm, by the edge of the *deltoid* muſcle, as high up as where the *pectoralis* goes over the *axilla* to its implantation in the *os brachiale*, cutting through the integuments and muſcles, and continuing my inciſion downwards and outwards obliquely, a little below the termination of the *deltoid* muſcle. Then, carrying on the inciſion almoſt tranſverſly for a ſmall ſpace, but in a ſemicircular direction, by aſcending to the external part of the arm, as high up as the fold of the integuments in the *axilla.* The intention of this ſemicircular line through the muſcles and integuments is, that when raiſed from the bone, they may become the flap, to fill up the *axilla* after the bone is removed, and the arm amputated. The next inciſion is to begin at the *proceſſus acromion*, and muſt be continued quite through the *deltoid muſcle*, according to its length, till it arrives at the *os brachii*, terminating in the ſemicircular inciſion before deſcribed. This perpendicular inciſion from the top of the ſhoulder ſhould not make an equal diviſion of the *deltoid muſcle* or intended flap, but the larger portion ſhould be on the outſide of the arm. I then paſs my knife under the lower edge of the internal half flap, and diſſect it up as high as poſſible. The tendon of the *pectoralis* will conſequently come into ſight. I then paſs under it the fore finger of my left hand, which finger ſerves as a conductor to a crooked knife with a blunt point, with which I divide that muſcle near its implantation in the *os brachii.* If the veſſels are not ſufficiently expoſed, ſo as to be taken up with eaſe, I cut through the outer head of the *biceps.* The veſſels being then laid bare, I paſs a ſtrong flat ligature, about eight inches long, under the artery firſt, by means of an inſtrument fixed in a flat handle, like that of a diſſecting knife: this inſtrument is ſomewhat in form of a crooked needle, but whoſe point and ſides are blunt. At ſome ſmall diſtance from the point, there is a ſlit or eye, which ſhould be tranſverſe, and from thence, in the convex and concave part, for half an inch in length towards the handle, it ſhould be grooved, that the ligature may lie flat, and paſs with greater eaſe; though, there will not be much reſiſtance in the cellular membrane, eſpecially if the thread about the eye of this blunt needle is rubbed over with ſome ſoft ointment. The ligature being paſſed, I deſire an aſſiſtant, with a diſſecting hook, to lay hold of it near the eye of the inſtrument; and, when it is firm on the hook, I withdraw the needle. The ligature is then double, and, by cutting through it at the hook, it is in effect two ligatures; the one of which I lay hold of, and, by drawing it a little, find out its other extremity, and then encloſe the artery in the ligature, about two inches below the head of the *os brachiale*, and ſecure it by the ſurgeon's knot. The ſecond ligature I tie in the ſame manner, about half an inch below the former, and then cut through the artery, about half an inch below the laſt ligature. I take the ſame precaution in ſecuring the brachial vein, without including the nerve, and divide it in the ſame manner after the ligature is made. I then give the ligatures of the veſſels into the hands of an aſſiſtant, who holds them upwards on the upper part of the *thorax* with one hand, and paſſes the finger of the other into the patient's *axilla*, ſo as to preſs the veſſels entirely out of the way, when the nerve is to be divided, which is the next part of the operation; the nerve ſhould be cut off without elongating it in the leaſt, and much higher than the artery, for a reaſon I ſhall mention hereafter. I then proceed to the diſſection of the flap on the external ſide of the ſhoulder, which flap being ſeparated ſufficiently high to expoſe the joint at the ſhoulder, I cut through the muſcles and capſular ligament in the ſuperior and lateral parts; and, by carrying the arm a little backward, the head of the *os brachii* ſlips out, and the remaining part of the burſal ligament is eaſily cut through. I then finiſh the amputation, by beginning my laſt inciſion at the *internal* part of the *axilla*, where the veſſels are kept entirely out of the way of the knife by the fingers of my aſſiſtant; and purſuing it in a ſemicircular direction, ſo as to meet the firſt inciſion on the *outer* part of the arm. The limb will then be totally diſengaged from the body, and ſhould any veſſel bleed freely, it is to be taken up by the *tenaculum*, and drawn forward, ſo as that a ligature may be made on it, without including the nerve. The ligatures are then brought towards the outer part of the arm, almoſt horizontally, and the inner flap is laid down ſo as to fall properly into the ſemicircular inciſion. I then paſs a large crooked needle, armed with a ſtrong flat ligature, through the inner flap, about an inch and half below the upper and internal part of the wound; then, conveying the point of the needle through the integuments, below the wound in the ſame line, ſo, as that the interrupted ſuture may be made in the ſame manner as is uſually done in any recent wounds, where the divided parts are brought into contact, to be healed by the firſt intention. I repeat the ſame proceſs twice in the outer flap. The *ligatures* are then brought through the middle inciſion of the *deltoid* muſcle, and permitted to remain there till they caſt off, which they generally do, in eight or ten days. I ſhould have remarked, that, in caſe the *acetabulum ſcapulæ* is not carious, before I bring the extremities of the veſſels forward, I pare off the cartilage, and apply dry lint to the bone, and let it remain till it drops off; and probably the granulations will then ſhow themſelves ſprouting from the bone. If the cavity of the joint ſhould be foul, the ſame application is as proper as any to forward the exfoliation of the diſeaſed bone. Every *ſinus*, that is long and not depending, ſhould be laid open.

THE bandage I contrived was chiefly of flannel; that piece which covered the ſtump was double, and, by gathering it with a needle and thread, it was drawn by the thread, ſo as to fit the top of the ſhoulder, and prevent its falling off; but it was further ſecured by ſlips of flannel about three or four fingers in breadth, and about two or three yards long; though theſe, as to length and breadth, muſt be proportionate to the ſize of the patient. The ſlips of flannel muſt be fixed one on each ſide to the upper edge of the bandage; then they immediately decuſſate each other as they paſs over the ſhoulder, the one end paſſing over the breaſt, and the other over the back, and croſs again at the oppoſite ſide in the *axilla*; after which the ends are brought forward to be pinned on the ſtump. There are likewiſe two other flannel ſtraps affixed to the lower internal and external edges of the cap-like bandage above deſcribed; the one of which paſſes acroſs the back, while the other is carried over the lower part of the *ſternon*, and both meeting below the *axilla* of the ſound arm, are there croſſed; then, being carried over the ſhoulder, are croſſed again, when the end that came under the *axilla*, and over the ſhoulder, muſt be carried to the back part of the neck, and terminate on the ſtump, while the other extremity of the flannel ſtrap is brought forward, and pinned on the ſtump. By this bandage the dreſſing will be properly retained on the wound, and, when neceſſary to dreſs the part, may with the greateſt eaſe be removed.

The advantages of the method here propoſed for taking off the arm at the articulation of the ſhoulder.

THE direction we have had from almoſt every perſon, who has hitherto wrote on this ſubject, is "to place the "patient in a chair." This cannot be either ſo convenient to the operator, nor ſo ſecure for the patient, as when he is laid horizontally on a table; for the acuteneſs of the pain will often oblige him to get up on his feet, notwithſtanding his firmeſt reſolution, and the utmoſt endeavours of the aſſiſtants to confine him in his chair; but, when properly ſecured on a table, the poſſibility of moving during the operation will be conſiderably leſs, and the operator no ways embarraſſed, as the aſſiſtants are placed entirely out of his way, and a proper ſpace left for the movement of the ſurgeon's hand.

We are next directed, to raiſe the arm of the patient nearly to a horizontal line with the ſhoulder. *This*, where it can be done, is of advantage, as in recent caſes, occaſioned by gun-ſhot, or compound fractures, with comminution of the bones, and laceration of the ligaments, or when the large blood veſſels are wounded; but in moſt of the caſes, for which I have performed this operation, it was impoſſible; the miſchief having been *originally* in the joint, and various abſceſſes in different parts having formed around the articulation; the *ligamentum capſulare*, and ſhort tendons implanted on the *cervix* of the *os brachii*, having ſuffered likewiſe from repeated inflammations, became ſo rigid as to occaſion a ſort of ſpurious *ancyloſis*, and the attempt to raiſe the arm under ſuch circumſtances, gives moſt excruciating

ciating pain: therefore it is adviſeable, to begin your operation in the fixed ſtate, in which the arm may chance to be, and to divide the muſcles in the order before related. Then, indeed, we may move it in ſuch directions as may be neceſſary in the progreſs of the operation.

The riſque of a fatal hemorrhage has ever been the great objection to this operation: therefore the firſt writers upon this ſubject, by way of ſecurity, recommend the paſſing a large needle, armed with a ſtrong ligature, through the integuments, between the bone and the large blood veſſels and nerves, and to encloſe the whole in a nooſe made by the ligature. This firſt ligature was paſſed much about the place where the artery has the name of *brachialis* given to it.

This part of the operation betrays great ignorance as well as cruelty; for I have proved, that the mere preſſure of the finger on the *ſubclavian* artery, above the clavicle made on the firſt rib, will ever be a ſufficient ſecurity againſt any fatal hemorrhage, when you come to that part of the operation, in which the danger of wounding the large blood veſſels is great. Since I have done this operation frequently in a crowded theatre of gentlemen, who profeſſed either phyſic or ſurgery, it would not at all be matter of ſurpriſe, if ſome critic, of a mechanical turn, ſhould have exerted his genius to contrive a ſort of *tourniquet*, rather than to depend on an aſſiſtant, as ſoon as he ſaw where the preſſure ought to be made, which I have been told has been attempted by ſome; but even this cannot be ſo ſecure as the compreſſion with the fingers, as they may be immediately removed, and as ſuddenly placed on the veſſel again, without the riſque of their ſlipping, which cannot be the caſe, if ſuch machine was ever ſo well adapted to the part which is to be compreſſed.

The firſt and ſecond time I performed this operation, I committed the ſame fault, as will happen to thoſe who follow *Le Dran* ſenior, and *Garengeot*'s method; for, by amputating too near the articulation, the cure was conſiderably more tedious than in the latter caſes, owing to the large ſurface of the wound, and the want of a ſufficient quantity of muſcles and ſkin to form the *lambeau* and its ſuture.

It is poſſible, from the diſrepute that the operation is in, where the *lambeau*, formed by the *gaſtroenemius*, was propoſed to ſhorten the cure in amputations below the knee, that ſome people may, from prejudice, be inattentive to this improvement of *La Faye*'s: I mean his propoſal of forming a flap or *lambeau* by the lateral inciſions of the *deltoid* muſcle, continuing the inciſion on one ſide in a ſemicircular direction acroſs the arm, about four fingers breadth below the articulation, ſo as to meet the lateral incifion on the other. The flap is then to be ſeparated from the anterior part of the *os brachii*, and turned up on the top of the ſhoulder, for the diſlodging of the head of the bone. By ſaving more ſkin and muſcle, one would expect that the flap, falling into the *axilla*, while the veſſels are bleeding, would unite therewith by the firſt intention, as he propoſes, and the cure be very expeditious; but this is merely theoretical: for the *upper part* of the *deltoid* muſcle not being in contact with any muſcular part, whoſe veſſels are in a bleeding ſtate, there is not any chance of union; but it is more than probable, that a *fiſtula* will enſue from the gleeting of the capſular ligament that remains, and the ſurface of the articulating cavity of the *ſcapula*; or, ſhould that cavity be carious, the diſcharge would not be better conditioned, and in neither caſe can the granulations ariſe till the cartilage or caries are thrown off: therefore, if the *lower portion* of the *lambeau* could unite with the divided parts in the *axilla*, it would be only for a time; for, as the exfoliations would make their way out at the moſt dependent part, and the ligatures would hang out of the inner part of the ſemicircular wound, which he deſcribes, conſequently but little advantage can be expected from this flap, till the granulations ariſe from the *cervix* of the *ſcapula*, after which, indeed, union may follow, compreſſion being made on the parts to be united.

THOUGH I have objected to the flap made in the manner deſcribed by Monſ. *Le Faye*, yet the ſame quantity of muſcles and integuments ſaved, in a different manner, expedites the cure amazingly. Before I relate the advantage I have experienced of the *lambeau*, I muſt obſerve, that we are ordered to tie the axillary veſſels as high as poſſible. To this I object, firſt, becauſe the blood veſſels are very elaſtic, and will contract themſelves; and, in the next place, the principal branches, detached to the ſeveral muſcles in that neighbourhood, being below the ligature, would conſequently be deprived of blood in future, and many of them, moſt likely, either waſte or ſlough off: to prevent which, I tie the axillary artery two inches below the head of the *os brachii.* The advantages of this are ſo evident, that I ſhall not trouble the reader any further on that head.

THE nerves that accompany the blood veſſels ſhould be divided much higher than the artery and vein; for they who have aſſerted, that the nerves are elaſtic, are miſtaken: that they are extremely ſenſible at their extremities is known to every ſurgeon and anatomiſt, though the cutting them through, at any diſtance from their terminations, is not attended with pain. Hence it follows, that, by leaving them very long, they will remain expoſed in the ſtump, and will cauſe the moſt violent pain, not only during the cure, but even after the wound is healed. This made me reſolve, after experiencing the bad effects of leaving them expoſed, to prevent them in future, and by not carrying my inciſion through the integuments that lie over the pectoral muſcle near its inſertion, and the upper and internal portion of the *deltoid*, the nerves have their *apices* ever concealed, even from the external air, and the patient never makes the leaſt complaint, either during the cure, or after the parts are healed, which was not the caſe with the ſecond patient who came under my care: therefore, I have ever ſince made uſe of this precaution, and it has ſucceeded to my utmoſt expectations.

In making the *lambeau*, I do not carry my inciſions up ſo high on the ſides of the *axilla* as has been directed by other writers on this ſubject, which was neceſſary in their method of operating; but, by my making an inciſion from the *acromion*, nearly through the middle of the *deltoid*, to the center of the tranſverſe ſemicircular inciſion, the head of the bone is more eaſily ſeparated from its articulation. If any caries is to be thrown off, there is a fair opening for it, and by this ſlit the applications are made to the *acetabulum*, and the dreſſing proper for producing granulations may be laid immediately on the part. By this ſlit likewiſe the ligatures have a free exit, and there is a dependent drain for the matter, at the ſame time that the lateral parts, brought into contact by the interrupted ſuture, will eaſily unite in a very ſhort time, and the upper part and ſlit will heal as ſoon as the granulations fill up the hollow left by the head of the bone.

I FLATTER myſelf, that, after the veſſels are tied and divided, the aſſiſtant keeping them out of the way of the knife, in the finiſhing the circle of the amputation in the *axilla*, has its uſe; as I have

I have been told, that, by an affected dexterity and agility in cutting through the integuments and muſcles in the *axilla*, the point of the knife has accidentally wounded the large veſſels above the ligatures that had been made, though there was neither anatomical knowledge, nor chirurgical ſkill wanting in the operator; but the accident aroſe merely from the veſſels remaining down in their natural ſituation after the ligatures were made on them. An unexpected hemorrhage from theſe veſſels would greatly embarraſs a ſurgeon, when he concluded all chance of danger of that kind was over; but the method I have laid down will give all poſſible ſecurity againſt the veſſels being wounded by the laſt turn of the knife, in cutting through the remaining integuments and muſcles in the *axilla*, after the bone is diſlodged.

The interrupted ſuture, on the inferior and lateral parts of the *lambeau*, is greatly contributory to the accelerating of the cure.

THE bandage is ſimple, being intended only to keep on the dreſſings. The facility of removing it, without giving the patient either pain or trouble, will be its ſtrongeſt recommendation; and, when neceſſary, any degree of preſſure may be made by compreſſes applied on the part, and the ſlips of the bandage paſſing over them.

I CANNOT conclude this chapter without aſſuring the profeſſors of ſurgery, that the emaciated appearance of the patient, and the very languid and low ſtate he may be brought to by almoſt conſtant and violent pain, with the exceſſive diſcharge of very thin matter, ought not *alone* to be obſtacles to the performance of the operation, as ſome of my patients, in this emaciated low ſtate, grew daily better in health from the time the limb was removed, contrary to the expectation of many of the firſt degree of eminence in the profeſſion, who were preſent at the operations.

THE ſecond caſe of this kind, for which I performed the operation, was in every reſpect very diſcouraging, as the patient was in the moſt violent pain before the operation, greatly emaciated, and had not the leaſt appetite, to compenſate for the immenſe diſcharge from the ſinuſes; and, to add to our apprehenſions, ſhe was ſeized ſoon after the operation with violent vomitings, which we concluded would ſoon carry her off, and probably occaſion an hemorrhage from the large artery. As ſhe could not retain either medicine or nouriſhment in her ſtomach, I recommended to the nurſe to burn ſome brandy, with a little mint in it, and to give it by tea-ſpoonfuls only, which ſoon took off entirely her ſickneſs and reachings to vomit, and, by continuing it at times for a few days, her ſtomach became capable of retaining her food, and every thing went on well till ſhe was perfectly cured.

CHAP. VI.

ON THE REDUCTION OF THE OS BRACHII WHEN DISLOCATED.

THE articulation of the *os brachii* with the *clavicle* and *ſcapula* makes the part we call the *ſhoulder*. The *acetabulum ſcapulæ*, by reaſon of its ſhallowneſs, can receive but a very little of the head of the *os brachiale*. They are ſurrounded by the capſular ligament, which is chiefly intended for the containing and equal diſtribution of the *ſynovia* to the bones within its *burſa*. The *ſcapula* is neceſſarily kept from the trunk by the clavicle, which alſo ſerves greatly to encreaſe the quantity of motion in the arm. From this particular apparatus of the joint, as well as becauſe the top of the ſhoulder is greatly expoſed to injuries from falls and blows, we cannot be under any difficulty in accounting for the diſlocation of the *os brachii* happening more frequently than that of any other bone of the body. The *ſcapula*, changing its ſituation as the motion of the arm requires, certainly makes a diſlocation leſs frequent than it would have been, had the *ſcapula* been fixed; but the grand ſecurity the bone has for its continuance in the *acetabulum* ariſes from the ſhort tendons, which paſs on all ſides over the capſular ligament to their implantation round the neck of the *os brachii*. It is poſſible, I may have been thought unneceſſarily prolix, and too minute in the deſcription of the muſcles of the ſhoulder, when I explained the method of amputating the limb at that joint, as they muſt be unavoidably cut through; yet, as I had an intention ſoon after to treat of the luxation of the *os brachiale*, I thought it would ſave a diſagreeable repetition of what was *neceſſary* to be known, in order to perform that operation properly: I will therefore refer the reader to that account of the muſcles, when I ſpeak of the reduction of this bone.

The head of the *os brachiale*, when diſlocated, will ſometimes be thrown into the *axilla*; at other times under the pectoral muſcle and clavicle; ſometimes outward or backward, rarely upward, as the *coracoid proceſs* and *acromion* prevent it, unleſs they are broken off.

Pain and immobility of the joint, after a fall or blow on the ſhoulder, the patient being unable to bring the lower extremity of his arm cloſe to his ſide, the arm appearing longer, and the ſhoulder lower, an inclination of the body to the injured ſide, and a hollow ſometimes obſervable below the *acromion*, are pretty ſtrong proofs, that the head of the bone has been thrown out of its ſocket; and, though in fat and muſcular people this laſt ſymptom be not immediately obſerved, yet, in caſe any doubt ſhould ariſe, if the arm is raiſed nearly to a right line with the top of the ſhoulder, the cavity in the *ſcapula*, from whence the bone had ſlipped, may be felt, and this will put the matter entirely out of diſpute.

WHEN we are aſſured of the fact, we are to conſider, which will be the moſt eligible way of returning the bone to its former ſituation. The means propoſed are various. It is no uncommon thing, immediately after the *os brachiale* is diſlocated, to ſee it reduced, with the greateſt eaſe, by a perſon on the ſpot raiſing the patient's arm ſufficiently high, and then, by applying his left hand clenched into the *axilla*, as high as poſſible, when, with his right hand, ſuddenly pulling the arm down with all his ſtrength, he makes as great an extenſion as poſſible, till ſuch time as the elbow is brought cloſe to the ſide; but this method does not *always* ſucceed.

It is propoſed by ſome, to lay the patient on the ground, then to apply a tennis-ball in his *axilla*, upon which, the operator, being likewiſe ſeated on the ground, after taking off his ſhoe, places his heel againſt the ball, then taking hold of the patient's arm above the elbow, he makes the extenſion with his hands, and at the ſame time puſhes the ball high up into the *axilla* with his heel; and thus the bone may ſometimes be returned into its proper cavity. Nevertheleſs, this attempt of replacing the bone is alſo often attended with as little ſucceſs as the former.

The operator, moſt likely, has then recourſe to the napkin, which he makes uſe of in the manner following. The patient being placed on a ſeat of a convenient height, and cloſe to a poſt or column, if there is one near, round which, and the patient's body, a long towel or band is paſſed, to prevent his body's yielding when extenſion is made by your aſſiſtants;

ants; a napkin or band being previouſly fixed round the arm juſt above the elbow, and properly ſecured, to prevent its ſlipping over the joint of the elbow; the ends of the napkin are delivered to a ſtrong aſſiſtant or two, by which they are to make extenſion of the arm when they are directed. The ſurgeon himſelf places a compreſs, or ball, in the *axilla*, and applies the middle of a girth or napkin, doubled corner ways, upon it; then ties the ends together in a firm knot, and ſlips this ſling over his own neck. He then tries, whether the length of the ſling be ſuch as gives him power to raiſe the bone, by bending his neck a little backwards; and, when he is ſatisfied in this point, he gives directions for his aſſiſtants to make their extenſion, which when he thinks ſufficient, he raiſes up the bone with the ſling round his own neck, by inclining his head backwards, and with his hands directs the head of the bone into its ſocket.

THE method that I have generally ſucceeded in, is, by applying a lever, ſuch as the common rolling-pin uſed in paſtry, whoſe middle part ſhould be made of a proper thickneſs, by rolling a napkin, doubled to about the breadth of ſix or ſeven inches, ſeveral times round it: this thick part of the lever is applied in the *axilla*, very high, as cloſe as poſſible to the patient's body; each end of the lever is delivered to a different aſſiſtant; the aſſiſtants are to keep the lever in the ſituation delivered to them, and not attempt to elevate it, as they are very apt to do; but, after the proper extenſion, to reſiſt firmly the depreſſion of the bone, when its reduction is attempted. When the patient is properly ſecured on a ſeat of a convenient height for the operator, a napkin or band, paſſed round the *lower* extremity of the arm above the cubit, as nigh as poſſible to the elbow, being delivered to your aſſiſtants, to make the neceſſary extenſion when directed; another very ſtrong aſſiſtant is to be placed behind the operator, on a chair or form, ſo as he may be able to exert his whole ſtrength in making the *counter* extenſion, by preſſing the *ſcapula backwards*, at the ſame time that extenſion of the arm is made forward. The ſurgeon then graſps the arm above the cubit, (the elbow joint being bent, and the hand ſupported) and ordering his aſſiſtants all to act together when he gives the word, the extenſion and counter-extenſion being made ſufficiently, but gradually, the ſurgeon directs thoſe who aſſiſt him in *extending the arm* to pull it obliquely downwards, inclining its lower extremity to the right or left, as may be neceſſary, and then to bring the elbow cloſe to the ſide. If the ſupporters of the lever, and the other aſſiſtants, act together, and do as I have mentioned, the bone is almoſt always reduced on the firſt attempt; but, in caſe the bone ſhould not readily ſlip into the *acetabulum ſcapulæ*, when the extenſion is at the full, the ſurgeon directs the perſon,

who

who is charged with the counter-extenſion at the *ſcapula*, ſuddenly to exert his utmoſt force with a jerk, and puſh the *ſcapula directly backwards*, and, by that means, the head of the bone will ſuddenly riſe into its ſocket. I make no doubt, but ſome of my readers may think this doctrine of preſſing the *ſcapula backwards* new, as, in general, the direction is, that the aſſiſtant go *behind* the patient, and, by placing his hands on the *acromion*, exert his utmoſt ſtrength in preſſing the *ſcapula forward* and *downward*, for its more immediate reception of the head of the *os brachii*, as we are told. To point out the impropriety of which, I would beg leave to add, that, beſides the muſcles already deſcribed, in the operation of taking off the arm at its articulation with the ſhoulder, there are others, by which the *ſcapula* is connected to the ſpine; for, not to mention the *latiſſimus dorſi*, which is ſometimes attached to the inferior *coſta* of the *ſcapula*, there is the *trapezius*, which, with its partner, forms a ſort of lozenge, and, from its being continued a conſiderable way down the back, has by ſome been thought to repreſent the friar's cowl or hood, and has hence received the name of *cucullaris*; but, conſidered without its partner, it is triangular, having its ſuperior angle affixed to the head, and its inferior to the laſt *vertebra* of the back; being attached to the *ſpinal proceſſes* of all the intermediate *vertebræ* of the neck and back, either *mediately* or *immediately*; the anterior angle terminates in part of the clavicle, the *acromion*, and the ſuperior edge of *the ſpine of the ſcapula* nearly its whole length. The extent of this muſcle is very great in its originations, but its ſubſtance is extremely thin.

IMMEDIATELY under the *trapezius*, is ſituated a muſcle, from its ſhape called *rhomboides*. This is likewiſe very thin, ariſing by a tendinous *faſcia* from the three inferior ſpinal proceſſes of the neck, and the three or four ſuperior of the back. Its fibres march directly from the different points of their originations, and are implanted into the *baſis* of the *ſcapula*.

THE *levator ſcapulæ* takes its riſe from the four ſuperior tranverſe proceſſes of the *vertebræ* of the neck, and thence deſcends to its inſertion into the upper angle and part of the baſe of the *ſcapula*.

THOUGH all the writers in ſurgery, as well as our modern practitioners, unanimouſly declare in favour of *extenſion* and *counter-extenſion*, in order to reduce the *os brachiale* when luxated, yet there are but very few, who truly put it in practice; for what they mean, in general, by *counter-extenſion*, is the reſiſtance made by the aſſiſtant preventing the body from following the arm, when extenſion is made.

It is well known, that, in a diſlocation of the *os brachii*, its head generally ſlips into the *axilla*; ſometimes it advances under the pectoral muſcle, and is lodged under the clavicle; at other times under the *coracoid* proceſs of the *ſcapula*; and the moſt favourable caſe is ſuppoſed to be, when the head of the bone lies immediately under the *cervix ſcapulæ*. Now, as long as the hollow of the neck of the *ſcapulæ* is ſituated immediately on the head of the *os brachii*, it is a very great obſtacle to its reduction; and thoſe, who have made uſe of *ambi's* *, with an intention to force the bone into its ſocket, have ſometimes broke off its head, and ſometimes even the *cervix ſcapulæ*; for, by the aſſiſtant's preſſing the *cervix ſcapulæ* forward and downward, at the ſame time that a lever is made uſe of to throw the bone into its place, it becomes compleatly locked in, and either the *cervix ſcapulæ*, or head of the *os brachii*, muſt give way; for, be the extenſion at the arm ever ſo great, and the body ever ſo properly ſecured from yielding, yet the *ſcapula* will keep its ſituation on the head of the *os brachii*, which is almoſt always the principal cauſe of difficulty in reducing this bone: for the muſcles, by which the *ſcapula* is connected to the ſpine, being ſo very thin, are conſequently ſtretched, and permit the *ſcapula* to follow, when the extenſion is made, while the muſcles of the *os brachii*, which ariſe from the *ſcapula*, are ſo ſhort and ſtrong, as not to yield in the leaſt to whatever extenſion is made, unleſs the *ſcapula* is puſhed back, as I have directed.

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* By the appearance of the band paſſed over the ſhoulder, and fixed to the ground, in uſing Mr. *Freke*'s *ambi*, one would ſuppoſe it might be intended to reſiſt the *ſcapula*'s following, when extenſion is made; but he was ignorant of an advantage of that kind, and ſays it is to keep the *ſcapula* down.

By the above method, I hardly ever failed replacing the bone when diſlocated, even after every method had in vain been tried by others; and I have frequently reduced it after it has been luxated for weeks, and once, after three months. I have likewiſe ſeen it done by others with the greateſt eaſe, who have obſerved the afore-mentioned directions. Though I have deſcribed, how additional force may be applied, in making the extenſion when neceſſary, yet I have generally reduced the bone by my own ſtrength, which has been greatly encreaſed, when I could reſt one of my feet againſt the frame or bar between the legs of the chair, when I made extenſion of the arm; but the ſucceſs you muſt have obſerved, depends on the force made uſe of in preſſing the *ſcapula* backwards; and ſure nothing can be clearer than this, that the bone with the cavity to receive, and the head of bone to be received,

ceived, muſt be ſeparated ſufficiently before the reduction can be effected*.

THERE are very few, who have attended any of our hoſpitals, but muſt have ſeen diſlocations in conſequence of a relaxation of the muſcles that paſs over the ſhoulder joint, which are eaſily reduced, yet as ſuddenly the bone again drops out of its ſocket, when the ſupport is taken away. I have ſeen great numbers of caſes of this kind; and in children there is a much better proſpect of recovery than in adults, in whom the diſlocation has been of long ſtanding. What I have generally done in theſe caſes, is firſt to ſupport the elbow by bandage, ſo as to keep the bone in the *acetabulum*, and then with *another* bandage to keep the arm cloſe to the body, which will confine it ſo as to prevent the bone from ſlipping out

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* AMBROSE PAREY, lib. 15, cap. XXVIII. where he treats of the method of reducing a diſlocated ſhoulder, when the bone is thrown forward, ſays, "*Sed in primis à tergo mini-*" "*ſtrum conſtituere oportet, qui validum laqueum*" "*(cujuſmodi eſt carcheſius qui ex duobus adverſariis*" "*loris et perpetuis conſtat) et latum alæ circum-*" "*jectum retrahet, ne cùm mox humerus extendetur*" "ſcapula ſequatur." Now, by this one would imagine, that he meant to make the counter-extenſion by keeping the *ſcapula* back; but, where he gives his ſecond method of reducing the bone, he ſays, cap. XXIII. l. 15. "*Dum hæc fiunt,*" "*ſtabit a tergo ægri miniſter, qui ejus humerum*" "*mantili aliquo lineo, laqueove aut loro ad id facto*" "*ſurriget, ſimulque calce nitens* ſummam omopla-" "tam

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" tam DEORSUM deprimet:" and to the ſame purpoſe he makes uſe of his aſſiſtant in the third method of reduction. Therefore, it is plain, he certainly meant to preſs the *ſcapula downwards*. In the plate deſigned to explain his firſt method of reduction by the napkin, one would imagine, by the band croſſing the ſhoulder, and the ſituation of the aſſiſtant, that the intention was the true counter-extenſion, thereby keeping the *ſcapula back*; but his words ſhew, that the ſecuring the patient from moving was all that was intended. Cap. XXII. l. 15. " *Quod ſi inveterata ſit lux-*
" *atio, et manus non ſatisfaciant, ægri humerum*
" *ad palum vinculo ante deſcripto alligandum vel*
" *miniſtro a tergo ſtanti, ut* fideliter contineatur
" *mandandum.*"

out of its ſocket. Bliſters ſhould be applied round the ſhoulder, and repeated as may be neceſſary, to ſtimulate the muſcles that ſurround the joint, that they may recover their natural powers; for they are the relaxed parts, and not the capſular ligaments of the joint, whoſe uſe is merely to contain the *ſynovia*; for when the tendons of the muſcles that encompaſs the joint are cut through, little force is requiſite to diſlodge the head of the *os brachii* from the cavity, with which it is articulated.

WHEN the bone is reduced, if the caſe is *recent*, little more is requiſite than to embrocate the affected parts with vinegar, and to keep the arm cloſe to the ſide with a napkin for a few days.

I KNOW ſome are of opinion, that a more advantageous extenſion of the arm is made, by placing the aſſiſtant on the ground, and giving him the ends of the band, faſtened to the patient's arm above the elbow, after they are paſſed between the operator's legs: by that means he will pull obliquely downwards. This method is recommended, when the operator makes uſe of the napkin round his neck, to raiſe up the head of the bone, when extenſion is made by the aſſiſtants; but, in this method, the operator would find much better employment for his hands, if, inſtead of guiding the head of the bone into the cavity, as directed, he would place the palm of one hand on the neck of the *ſcapula*, and the palm of the other on the back of the firſt, and then, with all his force, puſh the *ſcapula* backwards, at the ſame time he raiſes up the head of the bone with the napkin into its ſocket.

THE ladder, or door, are both on the ſame principle, the weight of the body making the extenſion in theſe attempts, while the operator, keeping the arm cloſe down to the ladder or door, prevents its returning while the body is on the oppoſite ſide. I have been told, that by faſtening a band above the elbow round the arm, and then drawing up the patient by his arm, by a chord paſſed over a pully fixed in a beam, the bone ſlips into its proper cavity. I ſaw this method once made uſe of with advantage, though it did not totally reduce the diſlocated bone.

THE caſe was this: a man of a ſtrong athletic form had, about ſix weeks before I ſaw him, diſlocated the *os brachii.* Various and fruitleſs had been the attempts to reduce it: the fibres, from repeated extenſions made, were become very rigid, to relax which his ſurgeon put him into the warm bath, and anointed his arm with emollient liniments. Thus prepared, I was deſired to attend the next attempt, which, though according to my own plan, was as ineffectual as the reſt, the bone continuing as fixed under the clavicle, as if it had been united to it. I then propoſed to ſuſpend the patient by the arm, and, while he was in that ſtate, to place a ſtrong perſon behind him, who ſhould lay hold of the neck of the *ſcapula* with both hands, and pull it backwards and downwards, by letting his whole weight at times hang on it, and now and then by jerks. By this means the bone ſhifted its ſituation, and was moved into the *axilla*, but did not go into its ſocket. However, the man, having undergone a great deal of pain, deſired to be let down for a time; and indeed he deſerved ſucceſs, as he had ſubmitted to every trial with the greateſt patience, and allowed us one more attempt with the rolling-pin, armed with the napkin wound round it, by which it then was happily reduced by a ſudden jerk, when I preſſed back the neck of the *ſcapula*, while the ſurgeon made the extenſion.

I HAVE ſeen another caſe lately, that had been attempted without ſucceſs; but, by ſuſpending the patient by that end of the *os brachii*, which is connected with the *ulna*, and the *ſcapula* being kept back as before directed, the diſlocated bone was happily reduced, while he was ſuſpended by the arm.

I OWN I am much ſurpriſed to hear *ſurgeons* relate, with that degree of poſitiveneſs they often do, *that the laceration of the capſular ligament of the ſhoulder joint* is frequently an obſtacle to the *os brachii* being reduced, when diſlocated; and that, in caſes of that kind, after ſeveral unſucceſsful attempts, they at length were happy in returning the head of the bone through *the ſlit* torn in the ligament, and then reducing it with the greateſt eaſe: that the patients ſoon after grew perfectly well, without the leaſt complaint, or ſuffering any abridgement of motion uſual to the joints. Can any one ſuppoſe this probable? for we know, that a lacerated and contuſed ligament will not readily unite, and, when once the mucilage of the joint has made its way through the capſular ligament, it would moſt likely inſinuate itſelf into the interſtices of the muſcles that ſurround the joint, and by inſpiſſating there, it would ſoon produce a ſpurious *ancyloſis*. I will not ſay, that violence may not have forced the head of the brachial bone through the capſular ligament of the ſhoulder joint more than once, as may have appeared on examining the parts affected after perſons had been killed by the accidents of falling from a conſiderable height, and the ſhoulder meeting with ſome hard body; but that this ſhould be accepted as an apology for want of ſucceſs in *common caſes*, is too groſs an inſult on the underſtanding to paſs current, even with thoſe who are fond of *the marvellous.* If a ſurgeon had failed in the attempt, and the bone remained diſlocated, or, that the joint had become ſtiff from great contuſion, let it be aſcribed to the *ligament being torn, and the head of the bone ſlipping through*, with all my heart; but to ſuppoſe *that* to have been *always* the caſe, where the operator could not reduce the diſlocation with that eaſe he has ſeen others do it, and that the patient recovered, under ſuch circumſtances, as ſoon as in ordinary caſes of this kind, and that the joint afterwards had all its former motions, requires more faith than I can muſter up on this occaſion.

APPENDIX.

IT is now near three years ſince moſt of the preceding pages were finiſhed; but, from a variety of circumſtances preventing my deſign of publication, they were not committed to the preſs till lately.

As the doctrines delivered in them were not any ſecret, any more than my practice in the hoſpitals, I am not at all ſurpriſed to find, that ſome modern writers have touched ſlightly on ſome of the ſubjects, particularly as I had delivered my ſentiments in lectures, at different times, to the gentlemen who attended *St. George*'s hoſpital as pupils. When any thing different from the general mode of practice is inculcated, it will always be ſtriking; and I dare ſay my ſentiments were minuted down by ſome at the time I delivered them; the natural conſequence of which muſt be a communication of their remarks to the ſtudents of other hoſpitals, with which, when the principal ſurgeons at length became acquainted, they would certainly adopt the methods, which the experience of others had confirmed to be right.

It is certainly no unpleaſant thing, to hear that people of the firſt rank in the profeſſion have, in ſome inſtances, joined me in opinion, and put in practice what they approved of. However, vanity had but little ſhare in inducing me to become an author again; and were the errors in practice, which I have endeavoured to point out, totally removed, whoever will may contend for the honour of being the reformer: the public benefit was my chief view; this, though a hackneyed apology, yet is not the leſs true.

I AM happy in this opportunity of acknowledging the candor of Mr. *White* of *Mancheſter*, in relating my method of taking up the large blood veſſels without including the nerves; and am not leſs obliged to Mr. *Aikin* * for his ſentiments and obſervations to inforce the practice; and nothing can be ſtronger than his aſſertion, that "this method "of tying arteries, for ſeveral years "paſt, has been practiſed by the inge-"nious ſurgeon of the *Mancheſter* in-"firmary, in which, from the frequency "of amputations on account of diſeaſed "joints, the faireſt trial has been given "of its efficacy. During this whole "time, a needle has never been uſed "in ſecuring an artery after an opera-"tion, except in a very few caſes, "where,

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* *Vide White*'s Caſes, p. 195.

"where, from the bad ſituation of the "artery, or ſome other uncommon cir"cumſtance, it could not be drawn out "ſo as to be tied; and I can with the "ſtricteſt truth aſſure the public, both "from what I have been three years "an eye-witneſs of, and from the moſt "reſpectable teſtimony of others, that "there has not been a ſingle inſtance "of returning hemorrhage after an "artery had been fairly tied in this "method."

"* AFTER having ſhewn the ſecurity "of this method of tying arteries, the "eaſe with which it is performed, and "the advantages it poſſeſſes of being "attended with no pain at all in ſome "caſes, and but little, comparatively "ſpeaking, in others, it ſeems almoſt "unneceſſary to add, that it is ex"empted from all the inconveniencies,

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* Page 97.

“ whether real or imaginary, attending
“ the uſe of the needle.”

THE account Mr. *White* has given of the uſe of ſponge, in ſtopping the hemorrhage from the capillaries, is worthy of notice; and I am fully perſuaded, that humanity firſt induced him to make trial of it, to reſtrain the bleeding of the *large blood veſſels* after amputation of the extremities; for the pain, conſequent to incloſing the nerve within the ligature, can only be deſcribed by thoſe who have felt it: indeed, the by-ſtanders, as well as the operator, if not deaf and blind, muſt be impreſſed with an idea of the patient's ſuffering the moſt excruciating torture. I believe nothing can do greater honour to Mr. *White*, than his immediately diveſting himſelf of that partiality natural to every man, in favour of a practice he had adopted and recommended to the public, and eſpouſing that of another, where he thought his intentions of avoiding pain to his patients were as fully anſwered; and a *greater* ſecurity given againſt a fatal hemorrhage, than in the method he had propoſed, and for ſome time made uſe of with ſucceſs. I am convinced, that a man of Mr. *White*'s ſentiments muſt have ſuffered conſiderably, had one of his patients died from the loſs of blood, where the ſponge *only* had been applied; eſpecially when he reflected, that he had neglected that ſecurity, againſt a fatal hemorrhage, which was in his power, namely, including the principal veſſels within ligatures. It is certain, mere compreſſion on very large arteries, continued for a proper time, will reſtrain an hemorrhage, eſpecially if the veſſel is ſo ſituated as to meet with reſiſtance from a bone, oppoſite to the preſſure made: by this I muſt be underſtood, a preſſure according to the length of the canal *. I know it will be ſaid, that after a tranſverſe ſection of an artery, it will, from its elaſticity, by contracting itſelf between the muſcles, be ſufficiently compreſſed to ſtop the bleeding; but I cannot be induced to believe, that any man of character would riſque his reputation by trying the experiment merely from ſuch an aſſertion.

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* Daily experience furniſhes us with inſtances of this ſort, as in wounds of the carpal artery, arteriotomy, &c. I ſaw a remarkable caſe lately, where,

Some people have ſaid, that the ſponge will not do more than dry lint; never-

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where, on opening a little tumour, that had been painful and throbbing for ſome days, and which to all appearance was a gum-boil, not properly maturated, and into which, the pain being very great, a lancet was paſſed at the patient's deſire: there iſſued out ſcarcely any thing but coagulated blood, and the bleeding was very little at the time of opening; but, in a ſhort time after, it bled very freely, and, before I could get back to the gentleman, he had bled little leſs than a common waſh-hand baſon full. On examining the part, a branch of the maxillary artery was evidently open, but ceaſed to bleed immediately on a proper preſſure being made on the trunk, as it paſſed over the mandible.

nevertheleſs, I ſhall ever be induced to try it, where I cannot get at the bleeding veſſel to ſurround it by a ligature. The larger the branch of the artery is, the leſs likely is the application of ſponge to ſucceed, eſpecially if the veſſel is ſo ſituated, that a tourniquet cannot be applied to ſtop the hemorrhage till the ſponge can gain an attachment. I have long wiſhed to hear, that it had been tried with ſucceſs, where the artery had been opened in blood-letting; for certainly there is every advantage of applying it with a proſpect of ſucceſs when the veſſel is laid bare; as the ſponge can be applied, and will not be removed by the hemorrhage; and every degree of preſſure neceſſary may be continued as long as the ſurgeon may think proper for ſecurity againſt a return of bleeding. If it ſhould take place under theſe circumſtances, without a diviſion of the artery, and the circulation ſhould be carried on as before, it muſt be allowed, that the public, as well as the profeſſors of ſurgery, will be greatly indebted to Mr. *White* for ſo valuable a diſcovery.

THE caſe mentioned by Mr. *White*, p. 57, is ſo very ſingular, that, ſhould a patient offer with a caries at the ſhoulder joint, I ſhould be induced to attempt the ſaving of the limb by an operation that ſeems likely to ſucceed, and is founded on that which he has deſcribed. He ſays, that "the *glenoid* cavity of the *ſcapula* "was not diveſted of its cartilage in "his patient;" yet it is certain that, in general, where matter has been formed within the joint, and of that degree of acrimony as to have deſtroyed the head of the *os brachii*, as well as the capſular ligament, the *cervix ſcapulæ* and *acetabulum* uſually become carious.

IT is not my intention, in the leaſt degree, to criticiſe on the method purſued by Mr. *White* on the above occaſion: far otherwiſe; for *Nature* had pointed out the proper place for bringing out the head of the bone, by two orifices already made, which when laid into one, and by a continuation of the inciſion a little farther, a ſufficient opening was made for the upper part of the *os brachii* to be brought out, and the ſaw to be uſed in dividing the bone: though, by what follows, had it been known, it is plain that Nature would have done her own buſineſs in a ſhort time, without the aſſiſtance of the ſaw*, as I have lately experienced in a caſe ſomewhat ſimilar, where the *tibia* in a lad, about twelve or thirteen, ſeparated from its upper *epiphyſis*, and from the lower part of the bone, in length about ſix inches; I did no more than enlarge the opening of the abſceſs, where I found the upper part of the bone looſe: I then paſſed a *ſpatula* underneath it, raiſed it up, and filled up the cavity under the bone with dry lint; and, in a ſhort time, the bone ſeparated at the lower end, and was eaſily withdrawn. The ſore is now healed, and the patient perfectly well. The *fibula* not having ſuffered, prevented the limb becoming ſhorter, and the intermediate ſpace between the extremities of the *tibia* were filled up with *callus*.

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* I make no doubt, but that this caſe of Mr. *White*'s may, *by ſome*, be thought to come under the head of the *marvellous*: however, thoſe who have had an opportunity of examining bones, which had been fractured, and whoſe extremities had not been brought oppoſite to each other, but were conſtantly moving againſt the muſcles, as the oſſific matter iſſued conſtantly from the ends of the broken bone, theſe conſequently became ſmooth and round by the action of the muſcles on them; and, had proper

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proper cavities been formed for their articulations, I am convinced, they would have formed a very good *arthrodia*. I formerly had in my poſſeſſion ſeveral bones, whoſe broken extremities were thus ſmoothed; and have at this time a caſe, that I am clearly of opinion is owing to the ſame cauſe, as the extremities of the *os brachii* have not united after a compound fracture; but I have recommended a brace to incloſe the arm, which at preſent ſeems of great ſervice.

Though I flatter myſelf I have greatly abridged the pain, as well as the length of time, in performing the operation of amputation at the ſhoulder joint, and of perfecting the cure; yet I muſt own, that I feel the greateſt pleaſure from the idea of a probability of ſaving the limb in future by an operation leſs ſevere, and, ſhould it ſucceed, with conſiderable leſs hazard of the patient's life. As I have not ever met with a caſe ſimilar to that of Mr. *White*'s referred to, I will offer my ſentiments of attempting the cure, ſhould a caſe happen to prove as I have always found it, *viz.* a ſmall aperture only in the capſular ligament, and the *acetabulum ſcapulæ* carious, as well as the head of the *os brachii.* Under ſuch circumſtances, I ſhould make my firſt inciſion through the integuments and lower part of the *deltoid* muſcle, beginning on the inſide towards the *axilla*, and continuing it tranſverſly to the outſide of the arm, nearly in the manner as before deſcribed; after which I ſhould make a ſecond inciſion, beginning at the *acromion*, carrying it deep down through the *deltoides* muſcle to the head of the *os brachii*, and continue its courſe on the bone, till ſuch time as it terminated in the tranſverſe ſection already made. Each flap of the muſcle ſhould be turned back, ſo as to bring in view the capſular ligament, which ſhould be carefully divided as far as may be done with eaſe. The elbow being then carried backward by an aſſiſtant, the head of the bone will immediately be protruded, and the remaining part of the capſular ligament may eaſily be divided. The extent of the *caries* muſt determine how much of the bone ought to be removed by the ſaw, or whether any part of it ſhould be taken away, if we could make a dependent opening for the matter, as Nature will in due time make the ſeparation, if the part be conſtantly dreſſed with dry lint, as the above caſes evince. In this method there is not the leaſt hazard of wounding the *axillary* artery; and, in caſe any ſmall branch ſhould be wounded, it may eaſily be ſecured as uſual by a ligature, and there is the advantage I have already propoſed, namely, an opportunity given for the *caries* of the *cervix* or *acetabulum ſcapulæ* to be thrown off during the healing of the wound. If the *os brachii* ſhould be carious below the inſertion of the *pectoralis major*, its tendon muſt be divided near its implantation into the *os brachiale*, which may be done with great ſafety, by paſſing the fore finger of the left hand under it, which will ſerve as a conductor to a curved knife with a probe point. The brachial artery will then be expoſed ſo as to be eaſily kept out of the way by an aſſiſtant, if it ſhould be thought neceſſary to ſaw off any conſiderable length of the bone. Should this method ſucceed, though not attended with that perfect uſe of the limb as related in Mr. *White*'s caſe, yet I am ſure, if the limb can thereby be preſerved, and the patient recover his health, I ſhall adopt the method I have propoſed; for, unleſs the capſulary ligament had been totally *deſtroyed*, the lateral inciſion, as deſcribed by Mr. *White*, muſt have proved inſufficient for the diviſion of the burſal ligament, in order to diſlodge the head of the bone from the *acetabulum ſcapulæ*; for, beſides the embarraſſment of the *deltoid*, the danger would be extreamly great of wounding the axillary artery, when the point of a crooked *biſtouri* was paſſed under the muſcle, to cut through the ligament on the ſide next its trunk, and a very conſiderable branch of the artery that ſurrounds the joint, would be likely to ſuffer by the knife, and, ſhould it happen, could not be got at without raiſing the *deltoid*, as I have propoſed, in order to make uſe of a ligature, to prevent a fatal hemorrhage.

THE partial dilatation of an artery, producing what is called *an aneuryſm*, by ſome is thought a caſe, which requires the amputation of a limb above the diſeaſed part of the artery, in order to prevent a fatal hemorrhage, and is recommended to be done early, to prevent a caries of the ſubjacent bones, which is no uncommon thing when the tumor becomes in contact with the bone. I cannot ſay, that theſe reaſons are ſufficient for me to recommend the operation in caſes of this kind, not only from the want of ſucceſs in general, where I have known it done, but from the obſervations I have made in living ſubjects, where *ſeveral aneuryſms* appeared in the different parts of the arteries in the ſame ſubject, and alſo on examining the bodies of thoſe, who have died after the operation of amputation had been performed; for the *aorta*, in one ſubject, I obſerved was unequally dilated in ſeveral places; in others, branches of the arteries, in different parts of the body, were formed into *aneuryſmal bags*. From theſe remarks, I think, we may conclude, that, in general, *the arterial ſyſtem is diſeaſed*;

conſequently, if we ſhould take off a limb, and make a ligature on the artery, above that part of it which was evidently dilated, we might, if the patient ſurvived the operation, be likely to bring on an *aneuryſm* in ſome other of the veſſels, ſhould they happen to be diſeaſed, much ſooner than if the amputation had not been performed; as, in future, the remaining arteries, in general, muſt contain a greater proportion of blood. This objection of mine cannot be ſuppoſed to take place, where external violence has ſuddenly given riſe to a tumor of this kind, and, nothing in the habit of body otherwiſe forbids the operation, no more, than I ſhould diſſuade from performing it, where the principal trunk of an artery had been divided by an accident.

THE injecting the parts of dead bodies having diſcovered, that in particular ſubjects, the branches, ſent off from the principal trunks of arteries, have now and then formed *anaſtomoſes*, with other branches that have gone off lower down; and from obſerving likewiſe, that, after the operation for the *aneuryſm* has been performed, where the artery had been unfortunately wounded in *blood-letting*, that the lateral veſſels have become dilated, in time, ſufficiently to carry on the circulation in that limb; from theſe obſervations, the moſt extravagant propoſitions have been by ſome ſuggeſted; *viz.* that the tying of the principal trunks of the arteries of any of the extremities, when wounded, may be done with a fair proſpect of preſerving the limb. I once ſaw an attempt of this kind in a *true aneuryſm*, ſituated in the ham: on which I ſhall make no further remark than that the patient died; and I dare believe, that the embarraſſments which occurred, as well as accidents in the operation, will deter the operator from making a ſecond attempt, ſhould a ſimilar caſe offer for his aſſiſtance.

In my directions for performing the operation of amputation, I have ſtrongly recommended the removal of the tourniquet, and of every preſſure on the veſſels, as ſoon as the principal branches of the arteries are ſecured; in order that the ſmaller veſſels may each receive its proportion of blood, and the number of ligatures, which might otherwiſe ſeem neceſſary, if the tourniquet is only a little ſlackened after each veſſel is taken up in ſucceſſion, according to its magnitude, be leſſened.

I HAVE lately ſeen two caſes, in which the patients died from the hemorrhage after amputation of the thigh. The one had the veſſels ſecured by the needle and ligature, with ſome muſculous ſubſtance, &c. as uſually, encloſed: the other was a patient of my own, in whoſe caſe the *tenaculum* was made uſe of. In the firſt, the ligatures had not in the leaſt given way, nor could any blood have eſcaped from the veſſels they had ſurrounded, neither was any veſſel found bleeding when the dreſſings were removed to examine the ſtump; poſſibly from the great quantity of blood the patient had loſt before it was diſcovered. On examining the ſtump after death, by injecting water into the femoral artery, a very conſiderable branch of that veſſel was diſcovered, which had eſcaped the moſt careful examination of the operator, and conſequently had not been ſecured by the needle and ligature. This perſon died on the fifth day after the operation.

THE other perſon's caſe was ſomewhat more ſingular. About the fifth day after the operation, on coughing, and turning himſelf ſuddenly, ſome blood was diſcovered in the bed. The dreſſings were immediately taken off; but no ſign of any bleeding veſſel could be found, except a little bit of grumous blood on the adipoſe membrane at the edge of the ſtump. It was then dreſſed up, the bark was given, the wound digeſted extremely well, the ſymptomatic fever went totally off, all the ligatures, except one, had come away, and not the leaſt bleeding enſued. About the twelfth day after the operation, the ſkin was brought forward by ſlips of plaiſter, and the ſore was perfectly clean, ſeemed to incarn, and appeared well diſpoſed to heal. On the thirteenth day, in the morning, the poor man was found dead, with a good deal of blood in his bed. A few minutes before he died, he ſaid he had had a very good night, and was in every reſpect as well as ever he was in his life. The ſtump was examined in the ſame manner as in the above mentioned caſe, and the water flowed out in as large a ſtream as in that, and, as it ſeemed, from the ſame branch that had eſcaped our ſtricteſt ſearch in the former operation; and neither the one nor the other was above an inch in length from its going off from the principal trunk that had been ſecured by the ligature. The other veſſels, from which the ligatures had dropped off, were found cloſed and *imperforate*, ſome of them not leſs than an *inch* in length above the ligature, others not quite ſo much.

I HAVE related theſe caſes to ſhew, that the hemorrhage, which proved fatal, was not owing *to the manner of making the ligatures on the veſſels*, but ſolely to a circumſtance which could not be foreſeen. We know that the arteries, merely from their elaſtic property, will contract themſelves greatly, and from the preſent method of operating by the double inciſion, the muſcles are left longer than the bone: theſe retiring, as well as the arteries, ſwell, and make a conſiderable preſſure on the veſſels lodged in their interſtices, and will, in ſome degree, prevent their bleeding during an operation, which veſſels may therefore eſcape the ſtricteſt attention of the ableſt operator. However, this ought to make us more particularly careful in our examination, before we take off the tourniquet, and to remind us of the neceſſity of raiſing the ends of the divided muſcles, whereby we may probably diſcover a branch of an artery that had eſcaped our notice, its bleeding having probably been reſtrained by its contracting within the interſtices of the muſcles. The patient ought not to be dreſſed up till ſuch time as a cordial has been given, and we have the ſtrongeſt reaſons to believe, that there is not any conſiderable veſſel left without a ligature, which may make it neceſſary to take off the dreſſings, on account of a freſh bleeding.

An impoveriſhed ſtate of the blood will often occaſion it to ooze out at almoſt every capillary: under ſuch circumſtances, lint and flour is the uſual application, and *bark*, with *elixir vitrioli*, are in general the beſt incraſſants. Every method for ſecurity againſt a freſh bleeding, in patients reduced very low, is of the utmoſt conſequence, as the ſudden loſs of an ounce or two of blood may prove fatal to them, if from a large veſſel.

I HAVE lately ſeen a very extraordinary caſe of this nature, where, three weeks after the amputation, though the ſore was conſiderably contracted, and in a healing ſtate, yet the blood, from its thinneſs, iſſued out from the extremities of moſt of the capillaries on the ſurface of the ſtump; and the quantity of blood loſt was ſo great, that the patient had like to have ſunk under it: this having happened two or three different times, and not having been reſtrained by lint and flour, with the neceſſary compreſſion on the extremity of the ſtump; the dreſſings were again removed, and the ſurface of the ſtump well covered with roſin very finely powdered, as well as with lint loaded with the roſin by way of dreſſing; from that time there was no further hemorrhage; and, on the removal of the dreſſings, in three or four days, granulations appeared, that had ſhot up, and the matter was extreamly thick and good.

The bark and elixir of vitriol were given freely. I have ſometimes, under ſimilar circumſtances, given the *pulv. ſtypticus* made with *alum* and the *ſanguis draconis* to great advantage; but it was not neceſſary here, as the bleeding was reſtrained, the patient daily gathered ſtrength, and the wound cicatrized extreamly faſt.

As I have ſtrongly inculcated the doctrine of Profeſſor *Monro*, to prevent pain from the unneceſſary repetition of ligatures, I thought it my duty to relate the before-mentioned caſes, that, in future, ſecurity againſt a fatal hemorrhage may be the principal object of our attention.

I have, in the chapter on Amputation, ſtrongly recommended the ſaving much more of the leg than is uſual in the common method of amputating below knee, in order to give the patient the uſe of that joint, whenever the caſe will admit of it; but thoſe who have not practiſed this method of operating, I know raiſe various objections, which exiſt only in their own imaginations; ſetting forth the difficulty of wearing caſes, of the kind recommended, by way of wooden leg, as the ſides of the caſe will be the reſiſting parts, and conſequently tear open the *cicatrix*. This may be true, if the machine or boot does not fit with exactneſs, and its upper part is not properly padded, ſo as to ſupport the weight of the body, by receiving the upper parts of the *tibia* and *fibula*; but, when the caſe is well fitted to thoſe parts, the patient will be able to bear on the boot without pain. This probably may require ſome little more attention at firſt, than where a patient is to bear on his *bent* knee in a wooden caſe. If the artificial leg is not made *properly*, that is, gives the patient pain by not fitting well, it is very immaterial, whether he reſts on a *bent knee*, or is ſupported by the upper part of the leg, immediately below the knee: but, in order to make the weight ſtill leſs on the heads of the bones, I have ordered Mr. *Addiſon* to divide that part, which embraces the thigh, like ſplints, to correſpond with its ſhape; theſe ſplint-like parts, by yielding a little, are brought firmly in contact with the thigh, by circular ſtraps, which being tightened, will prevent the weight of the body preſſing wholly on the upper part of the *tibia* and *fibula* for ſupport.

SHOULD the preſſure of the upper part of the boot give pain in any part, or be likely to occaſion an excoriation, I know it is uſual, under ſuch circumſtances, in order to defend, as they call it, the part from future injury, to apply a thick compreſs of cloth, expreſſed from brandy, immediately on the part complained of. One moment's reflection will ſhew the abſurdity of ſuch an attempt to relieve, as the preſſure muſt conſequently be greater on that part than before; but the certain and effectual way will be to unquilt the lining of the boot, and pad it *very thick* on each ſide of the part that had ſuffered by too great compreſſion; this muſt inſtantly take off the cauſe of complaint, occaſioned by the artificial leg. I can aſſert, that not one ſingle inſtance of the ſore's breaking out again has come to my knowledge in thoſe, on whom I have performed the operation in this manner; nevertheleſs, it may ſo happen, without objection to this method of amputating near the ancle; as we often ſee the *cicatrices* of ſtumps from amputations made as near the knee as poſſible, burſt out, merely from a bad habit of body. I poſſibly may not make more friends, if I ſhould adopt the method of preſerving a flap at the lower extremity of the *gaſtrocnemius*, which is, after a certain time, to be applied to the ſurface of the ſtump, and which, agglutinating, becomes a pad, on which, it is ſaid, that the weight of the body will be as well ſupported, as by the heel before the amputation was performed, and that without pain in the part preſſed on.

THIS method of amputation has been uſed repeatedly at different periods, but, from want of ſucceſs, it has as often come into diſrepute; however, the flattering hopes that it might ſtill be made uſeful, encouraged Mr. *O'Halloran*, ſurgeon to the hoſpital at *Limeric*, in the year 1761, to revive it. On his pointing out the defects of former attempts, and recommending the method he had practiſed with very extraordinary ſucceſs, Mr. *Charles White*, ſurgeon of the *Mancheſter* hoſpital, adopted it, and it has proved as ſucceſsful under his management; the which he has communicated to the public in his *Chirurgical Caſes.* He there obſerves, that the operation has always been attended with the greateſt ſucceſs, inſomuch that the patients could walk as well as ever, and ſome of them twenty miles in the day, without ſuffering more from fatigue, than might be expected from a journey of that length; but not any thing extraordinary from bearing on the end of the ſtump, neither did any of thoſe ſtumps ever break out again, or even excoriate, by bearing on them. I have ſuch authority in my poſſeſſion, as induces me to believe, that Mr. *O'Halloran*'s method deſerves preference to that I have recommended, in the preceding pages, of amputating near the ancle joint; and I ſhall not ever be aſhamed to retract my methods, where I am convinced, that advantages will ariſe to my patients, by adopting a practice recommended by others, which, experience in repeated inſtances, has proved ſucceſsful.

A MAN was brought into *St. George*'s hoſpital, *Nov.* 23, 1771, on account of a hemorrhage from a ſcrophulous ancle, with caries of the tarſal bones. Though the bleeding was reſtrained at that time by doſſils of lint, yet, the operation of amputating the limb was judged neceſſary, to prevent another bleeding likely to prove fatal, as the man was rendered extremely low from the bad ſtate of health he had long laboured under, as well as by the loſs of blood, in the neceſſary examination of the ſtate of the diſeaſed parts, previous to his admiſſion into the hoſpital.

The remaining part of the limb above the ancle being ſeemingly free from diſeaſe, I determined to amputate near the ancle joint, ſaving a flap or *lambeau*, continued from the *gaſtrocnemius*, as recommended by Mr. *O'Halloran* and Mr. *White*, which I performed in the following manner.

The patient being placed properly on a table, and the tourniquet applied as uſual, I ordered the knee of the diſeaſed limb *to be bent and turned inwards.* The advantage of this poſition muſt be extremely obvious to every ſurgeon, who intends to perform the operation *with the flap.* The aſſiſtants having firmly ſecured the patient, and well ſupported the leg; at the diſtance of about ſix inches from the lower part of the *malleolus externus*, or inferior extremity of the *fibula*, I paſſed a *ſtrong*, *ſtraight catlin*, not feather-edged tho' pointed, through the integuments and muſcular fleſh that forms the lower part of the calf of the leg, and at a proper diſtance from the back part of the *tibia* and *fibula*, to give due thickneſs to the flap. The knife having paſſed ſufficiently through the integuments of the oppoſite ſide, I continued my inciſion downwards between the bones and great tendon, almoſt as low as its implantation into the *os calcis*; then, turning the edge of the knife towards me, I cut through the tendon and integuments. This ſingle ſtroke with the knife was effected almoſt as quick as thought, and *the flap* was thereby perfectly formed. *This* was then turned upwards, and kept out of my way by an aſſiſtant. I then, with a large *crooked catlin*, began my inciſion of the integuments on the *internal*, or rather, according to the preſent poſition of the limb, the under ſide, as high up as the upper part of *the flap* indicated; then, bringing my knife over the anterior part of the limb, I finiſhed my ſemicircle at *the flap*. The interoſſeous ligament and muſcles being cut through, the whole of the divided parts were drawn up as uſual, and ſupported by the ſplit piece of leather. The bones were then denudated as high as poſſible, to make room for the application of the ſaw. This done, I ordered the aſſiſtants, that had the care of the limb, to keep the leg quite ſteady, that the bones might be ſawed exactly ſmooth. The remainder of the operation was finiſhed as in the common method of amputating.

I KNOW that the by-ſtanders, when they ſee the operation performed in *this manner*, will think *the flap* too long; but, was it really ſo, it would be a fault on the right ſide, as its being too ſmall would certainly retard the cure, and the flap, being ſtretched to cover the end of the ſtump, would not be ſo good a pad between the bone and boot, to prevent pain from the weight of the body in walking, running, &c.*

THE many idle reports that have been ſpread, relative to the diſadvantages from this method of amputating, and the concluſions drawn from reaſoning on *falſe* facts, determined me to make enquiry, as to the ſucceſs in general, from thoſe who had performed the operation repeatedly with the flap. I ſhall not trouble the public at preſent with the authorities in my poſſeſſion, by way of anſwer to the objections I have heard made by ſome, who have never performed the operation themſelves in *this manner*, nor even ſeen it performed by others; and who nevertheleſs aſſert, that the ſores break out again, that the patient cannot bear the weight of his body on the end of the ſtump, and that the bones preſſing into the flap (turned up by way of cuſhion) produces ſo much pain, that he cannot walk for any length of time, as well on this account, as from the fatigue occaſioned by ſo great a weight as a wooden leg, whether made *ſtump-faſhion*, or to reſemble the ſound leg of the patient. But, firſt, as to the ſore's breaking out again, if we give credit to the caſes related by Mr. *White*, we ſhall find that the report is ill grounded. From the ſame authority we are told, that the patients can, not only bear the whole weight of their bodies on *the very end of the ſtump*, as well as they could on the heel of their ſound leg, but that ſome of them have been able to walk many miles in the day, without complaining of fatigue, more than they probably would have done of ſo long a journey had they not loſt part of the limb. In anſwer to thoſe, who ſuppoſe the length of the limb preſerved when introduced into the boot or artificial leg, will ſooner occaſion fatigue in walking, or other exerciſe, than when the weight of the body is thrown on the bent knee in an artificial leg of any ſort; I muſt obſerve, that, after amputations made below knee, according to the uſual method of amputating, *the weight* of the artificial leg, be it more or leſs, muſt be moved by the muſcles placed on the fore part of the thigh. Now, when thoſe muſcles act with the advantage of a very long lever, applied cloſe to the weight to be moved, and aſſiſted by thoſe muſcles, which bend and extend the leg, no great knowledge in mechanics is requiſite, to ſay which length of ſtump is preferable to give the patient a chance of uſing exerciſe, by walking, riding, &c. with the leaſt fatigue. When people talk of the ends of the bones giving pain by preſſing into the flap, it is plain they have not given themſelves time to think, or have not remarked the effects of the oſſific matter, diſcharged from the extremities of fractured bones not brought into contact, and conſequently not united; the ends of ſuch fractured bones, by the action of the muſcles, become ſmooth, and permit the limb to be moved, without producing the leaſt pain in the muſcles that paſs immediately over the ends of the bones that have not been united after their being fractured. When once we conſider, that from the ends of ſawed bones, as well as of thoſe that have been broken, the oſſific matter will ooze out; we muſt allow, that this matter, when condenſed, will give a ſmooth ſurface to the ſawed ends of bones, that the muſcles applied to each other, after granulations have been thrown out on their ſurfaces, if kept in contact, will unite by *the firſt intention*, as it is called; and that after the bones are rendered ſufficiently ſmooth by the *callus*, ſo as to allow the weight of the body to be thrown on their extremities, without producing pain in the flap, we all know, that preſſure on muſcular fibres will ſoon make them become tendinous, and that, by the attachment of the bleeding veſſels of the flap to thoſe of the edges of the bone, a ſort of *perioſteum* will be produced. When the patient can bear on the end of the ſtump, and make uſe of exerciſe, we can eaſily ſuppoſe, how this pad muſt become hard, like the hands of laborious people, proportionate to the preſſure the part undergoes from exerciſe.

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* The patient was much eaſier after the operation; but his cough continued violent, and his ſweats were very profuſe. The flap, when dreſſed, looked as well as the other parts of the ſore; he daily grew weaker, and died on the eleventh day after the operation. On the body being opened, both ſides of the *thorax* were found full of matter, the lungs nearly deſtroyed, and many of the parts in the *abdomen* were alſo in a diſeaſed ſtate.

I HAVE lately performed this operation on a young man. The bones of the *tarſus* and *metatarſus* of whoſe right leg being carious, from a bad habit of body, the diſcharge was extremely great, the pain violent, and his whole foot ſo enlarged, that deferring the operation longer, in hopes of the carious bones crumbling away, and of preſerving the foot, was thought improper; as the pain encreaſed, with loſs of appetite, and little or no reſt, it was greatly to be feared, that the patient would ſoon ſink under the diſcharge. The caſe for amputation with the flap being fair, nothing more was to be apprehended from this method, than the natural conſequences of the operation in the uſual way, where patients labour under an ill habit of body.

THE operation was performed nearly in the ſame manner as that before mentioned, as long a flap being left; but, in the progreſs of healing, I found that, had more ſkin been left on the flap, and more of the *tendo Achillis* taken away, it would have much facilitated the healing of the ſore, as the tendon threw out a very large *fungus*, which was with great difficulty ſuppreſſed. To obviate this in future, I would recommend, that the integuments ſhould be drawn back by an aſſiſtant, from the *tibia* and the *fibula*, the whole length of the intended flap, before the knife is introduced; as ſoon as the *catlin* is paſſed through, as it deſcends, its courſe ſhould be directed obliquely outwards, ſo as to take off half the thickneſs of the tendon, before the blade is turned to cut through it; and, previous to its diviſion, the foot ſhould be bent upwards, as much as poſſible, by the aſſiſtant, who ſupports the lower end of the leg. While this is doing, the other aſſiſtant ſhould draw up the integuments on the back part of the leg, as poſſibly the knife may then be carried through the tendon almoſt horizontally. The muſcles and ſkin being then on the ſtretch in oppoſite directions, I ſhould hope the above defects in the operation by this means would be remedied. About the tenth day, the flap was extremely clean; but a foulneſs continued on the ſurface of the ſtump, which made me think it prudent to poſtpone the attempt of uniting the parts, by bringing the flap in contact with the ſtump. Though the ligatures came all away with the dreſſings on the eighth day, and the ſtump became a little cleaner by the uſe of digeſting ointments, yet the granulations did not riſe kindly; nevertheleſs, on the twelfth day, I applied the flap to the end of the ſtump, and ſecured it ſo by proper bandage. I did not remove the dreſſings for two days, and then with the greateſt care and attention, ſo as not to riſque the ſeparation of any attachment the flap might have obtained. The under part ſoon adhered pretty firmly; but the end of the flap could not get attachment to the upper part of the ſtump, for want of granulations on its ſurface, ſeemingly owing to a thin acrimonious diſcharge. I then gave the patient the *cortex Peruvianus*, and dreſſed the ſurface of the ſtump with the *merc. præcipitate rub.* finely levigated. The tendon was daily touched, either with the *lunar* cauſtic or the *Roman vitriol.* I did not attempt at this time to unite the upper part of the flap; but waited till the ſore looked cleaner, and the matter became better. At the end of two months, the ſore was healed, but the artificial leg was not ready till the tenth week after the operation, when the patient was able to bear his whole weight on the end of the ſtump, which indeed had a moſt excellent cuſhion of fleſh, and he walked ſo well, that few people diſcovered he had loſt part of his leg.

I FIND, on peruſing the chapter on the fractured *patella,* that I have omitted to relate a kind of temporary lameneſs, that I have known frequently to happen from a preternatural body lodged within the joint of the knee, which, at times, ſuddenly ſlipping between the lower extremity of the *femur* and the upper part of the *tibia*, has, during its reſidence between the two bones, occaſioned excruciating pain in *certain directions* of the limb, as well as an immobility of the joint of the knee; but when, from change of poſture, or by accident in the examination of the part affected, the extraneous body retiring within the cavity of the joint becomes free from preſſure, the perſon inſtantly becomes quite eaſy, and the joint almoſt as ſuddenly is capable of performing its uſual motions. The cauſe of complaint is one or more looſe cartilaginous ſubſtances lying looſe within the joint of the knee, the ſmoothneſs of their ſurfaces, and the mucilage of the joint, favouring their paſſage to different parts of the joint, where leaſt reſiſtance is found, they will ſometimes, from a ſudden motion of the limb, eſcape with the *ſynovia*, either anteriourly or poſteriourly, ſo as eaſily to be felt on the outſide of the joint; and when ſo moved as not to be in contact with the ſurfaces of the neighbouring bones in the different motions of the joint, very little pain is conſequent of ſuch ſituation of theſe preternatural bodies; but, when detained between the bones, as above deſcribed, an attempt to bear any weight on the injured limb, or even to extend it, will be productive of violent pain, as above remarked.

ART ſeems but little concerned in curing this ſpecies of temporary lameneſs; but I have ſeen ſeveral people, who had ſuch frequent returns of this complaint, that on obſerving theſe looſe cartilages, at times, on the outſide of the extremities of the bones, within the burſal ligament, have been able to return them inſtantly into the joint, by placing the limb in a certain direction, then, by preſſing on the capſular ligament, at the part where the looſe cartilage had ſlipped out, the redundant *ſynovia* has immediately eſcaped on the other ſide of the *patella*, and carried the moveable cartilage with it; nevertheleſs, the ſudden lameneſs happening ſo repeatedly, with violent pain, in others, that they have been obliged to apply to ſurgeons to extract them, by an opening made by inciſion through the capſular ligament, I have twice done the operation myſelf with ſucceſs, and have ſeen it done by others: nevertheleſs, the cutting through the burſal or capſular ligament is not ſo trivial in its conſequences, as to be done on every occaſion that offers, where redundancy of the *ſynovia*, or even matter, occaſions the enlargement of the joint: for, in thoſe caſes, the ligament is greatly on the ſtretch, and conſequently inflamed: therefore, under ſuch circumſtances, cutting through the ligament of the joints may endanger the patient's limb, or even his life. But, where the diſcharge of ſuch preternatural body from the joint of the knee is intended by an opening to be made through the capſular ligament, the following method has proved ſucceſsful.

THE patient being laid on his back on a bed, with his knee extended, and the heel a little raiſed, an aſſiſtant having confined this preternatural body on one ſide of the *patella*, where the burſal ligament ſeems thinneſt and moſt flaccid, another aſſiſtant ſhould draw down the integuments with his hands, till they form *rugæ* below the knee, and become greatly on the ſtretch on the lower part of the thigh, and on that part of the joint, where the looſe cartilage may be felt. An inciſion ſufficiently long is then to be made through the integuments, ſo as to give an opportunity of making the inciſion through the ligament of a proper ſize to let the looſe cartilage eſcape through the wound. This effected, the integuments are immediately to be drawn upwards, and with proper compreſſes, expreſſed from brandy and water applied, and ſecured on the diſordered part by bandage, the limb is to be laid in ſuch direction, as the capſular ligament may be moſt relaxed, to prevent inflammation; at the ſame time be careful not to raiſe the limb much higher than a level with the thigh, as the crucial ligament being on the ſtretch, will create pain in the part, and an inflammation may be induced in the wounded part, which otherwiſe would not happen.

The neceſſity of the body's being in a proper ſtate before this operation is performed, muſt be ſufficiently obvious to every ſurgeon of experience; that the patient remain in bed a good while after the external wound is healed is of the utmoſt conſequence; becauſe the capſular ligament does not ſo readily unite as the integuments and muſcles. Anodynes, that keep the ſkin moiſt, are extreamly ſerviceable. As long as the joint remains free from pain, it ought not to be diſturbed to renew the applications, but the keeping them moiſt with brandy and water, or the *aqua ſaturnina*, in general is all that is neceſſary; the eighteen-tail bandage is the moſt proper, in caſe the renewal of dreſſings may be adviſeable; though in moſt of the caſes I have ſeen, where the operation had been performed, and the proper attention paid to the ſituation of the limb, the patients did well, without any other trouble than confinement; yet, I muſt own, that, in an inſtance or two, from miſmanagement, I thought they would have loſt their lives: for, as they ſuffered but little in the operation, and the wound was ſeemingly healed in a few days, by too early a uſe of the limb, the moſt threatening ſymptoms came on.

In ſome of the foregoing pages I have remarked, that the uſual method of making the ligature on the ſpermatic chord, previous to the removal of a ſcirrhous teſticle by the operation of caſtration, was generally attended with moſt excruciating pain, and a ſymptomatic fever, ſometimes alarming: to prevent which, I recommended, that the ſpermatic chord and diſeaſed teſticle ſhould be denudated, as directed by authors, and practiſed by the moſt eminent ſurgeons at this time; then, when the ſpermatic chord is quite free, to cut it through, as near to the diſeaſed teſticle as the healthy ſtate of the chord indicated, which being done, to deliver the extremity of the ſpermatic chord, that is ſeparated from the teſticle, to an aſſiſtant, who is to preſs it lightly between his finger and thumb, to prevent any hemorrhage till the diſeaſed teſticle is removed from the *ſcrotum*. When that is done, the operator is to take hold of the ſpermatic chord with the finger and thumb of his left hand; then, on the diſcovery of the end of the ſpermatic artery, to paſs the *tenaculum* through it, and gently drawing it out of it's *theca*, he orders an aſſiſtant to paſs a flattened ligature round the artery, and ſecure the nooſe properly. If the vein ſhould bleed freely, the ligature ſhould be repeated. I have done the operation ſince, in the manner I have related; and another gentleman was ſo far convinced of the advantage of this method of preventing a hemorrhage, that he performed the operation in the ſame manner, and we had the ſatisfaction of ſeeing our patients go through it without the leaſt complaint of pain on making the ligature, or during the whole proceſs of cure.

As I make no doubt, but that many perſons, who may be induced to make trial of the *anodyne ſudorifics*, will be extremely happy in the ſucceſs of the medicines, if made uſe of, for violent pains, whether rheumatic, or conſequent to ſcorbutic humours ſuppreſſed, eruptive fevers not happily carried off, or ſwellings of any of the extremities from the ſame cauſe, putrid ſores, violent contuſions of the different parts of the body, concuſſions of the brain, and, as the beſt anodyne after operations, by procuring a gentle *diaphoreſis*: I ſay, from the ſucceſs of this kind of medicine in the above-mentioned complaints, I apprehend that thoſe, who have experienced its effects, may conclude they are poſſeſſed of a *catholicon*, and give it indiſcriminately to every patient that applies to them for relief: It will therefore be proper to give ſuch practitioners a caution, leſt the want of experience and obſervation may prove fatal to their patients, bring diſcredit to themſelves, and *the anodyne ſudorific medicines* into diſrepute, thereby preventing in future that good to mankind, that is certain, when they are adminiſtered with judgment. I have known the *anodyne ſudorific* medicine given for ſome of the abovementioned complaints, where the patients were *hectical*, and to thoſe whoſe lungs were affected, or accompanied with ſcrophulous complaints; but in ſuch caſes this kind of medicine is extremely improper, as well as in concuſſions of the brain, if given ſo long after the accident, as matter may be ſuppoſed already formed on the brain. Where the uſe of this kind of medicine, as a powerful *diaphoretic*, muſt neceſſarily be repeated at proper diſtances, to obtain a perfect cure; ſuch diſtances depend entirely on the effects of the medicine; and attention muſt always be had to ſupport and ſtrengthen the patient by proper diet, medicines, &c. on the intermediate days.

EXPLANATION OF THE PLATES.

PLATE I. See p. 30.

REPRESENTS a ſide view of the human ſcull, intended *chiefly* to aſcertain preciſely the part that ought to be laid bare where advantage is expected to be obtained, by diſcharges from the inſide of the *Cranium* through the ſutures.

a, The prominent part of the *Os Frontis*, which marks the ſituation of the ſubjacent *ſinus*.

b, *Os unguiforme*.

c, *Os Maxillare*.

d, *Its naſal proceſs*.

e, The *Sulcus*; in which is ſituated the lacrymal duct or ſac.—N. B. This *ſulcus* is formed partly by a groove in the unguiform bone, and partly by a groove on the inner edge of the naſal proceſs of the maxillary bone, which grooves uniting, form a *foramen* within the orbit; through which the lacrymal duct paſſes into the noſe, as will be ſhewn in the next plate.

☞ I have remarked in ſeveral ſubjects a *deep Sulcus* in the maxillary bone, on *its external part*, near the internal *Canthus*; it is excavated partly in this bone, below the edge of the orbit, and is continued upwards on the naſal proceſs, as is ſhewn by the ſhadowing in the plate, cloſe to the edge of the orbit. I would ſtrongly recommend to thoſe who intend performing the operation, for the *fiſtula lacrymalis*, to examine carefully ſeveral ſculls, and they will find what I have related. As this *Sulcus* is remarkably deep in many ſubjects, it *may* be miſtaken for the *Sulcus* that contains the lacrymal duct; I have known this happen for want of this attention, and to people whoſe judgment and ſkill could not be cenſured on any other occaſion. The inciſion was made through the integuments fairly into *this Sulcus*, and the bone perforated into the noſe; but, the ſac not having been opened, we are not at a loſs to account for the operation proving ineffectual.

To prevent an error of this kind, I would adviſe the operator always to preſs the under eye-lid, with the *index* of his left hand, deep into the orbit near to the internal *canthus*. The inciſion, through the integuments, will then be made *within* the orbit; the point of the knife muſt paſs in, almoſt as high as the tendinous line of the *orbicularis* muſcle, and its courſe be continued downwards and outwards, forming a ſegment of a circle by following the ſhape of the internal edge of the orbit; the whole extent of the inciſion need not exceed ¾ of an inch. By this method, the ſac, in which the matter is contained, is generally opened; but if not ſufficiently, it may eaſily be enlarged; when poſſibly the original canal for the lacrymal duct may be recovered; or in caſe it becomes neceſſary to make a new paſſage, the operator will be ſure of doing it effectually.

f, *A probe* introduced by one of the *alveoli* of the third of the *dentes molares*, into the *ſinus maxillaris*, or, *antrum Highmorianum*, as it is moſt frequently called.—To demonſtrate this cavity, I was obliged to remove part of its external *paries*; by this view of the parts, is ſeen which tooth ought to be extracted, to give a dependent drain to matter, when formed in this *ſinus*.

g, *The coronal ſuture.*

h, *The lambdoidal ſuture.*

i, *The ſquamoſe ſuture*, ſo called from the edges of the temporal and ſphenoidal bones being extended over the edges of the frontal and parietal bones, like the ſcales of fiſh.—The indentations of one bone with the other in this part, not being obvious in their connected ſtate, ſome authors have called this kind of joining the bones, a *falſe* ſuture; therefore as ſoon as the appearance of *the true* ſuture commences, inſtead of calling it, the *additamentum* of the ſquamoſe ſuture, I chuſe to call it, *ſutura mammillaris*, from the termination of the *ſutura ſquamoſa*, during its continuance over the maſtoid proceſs, till it is loſt in the *lambdoidal ſuture.*

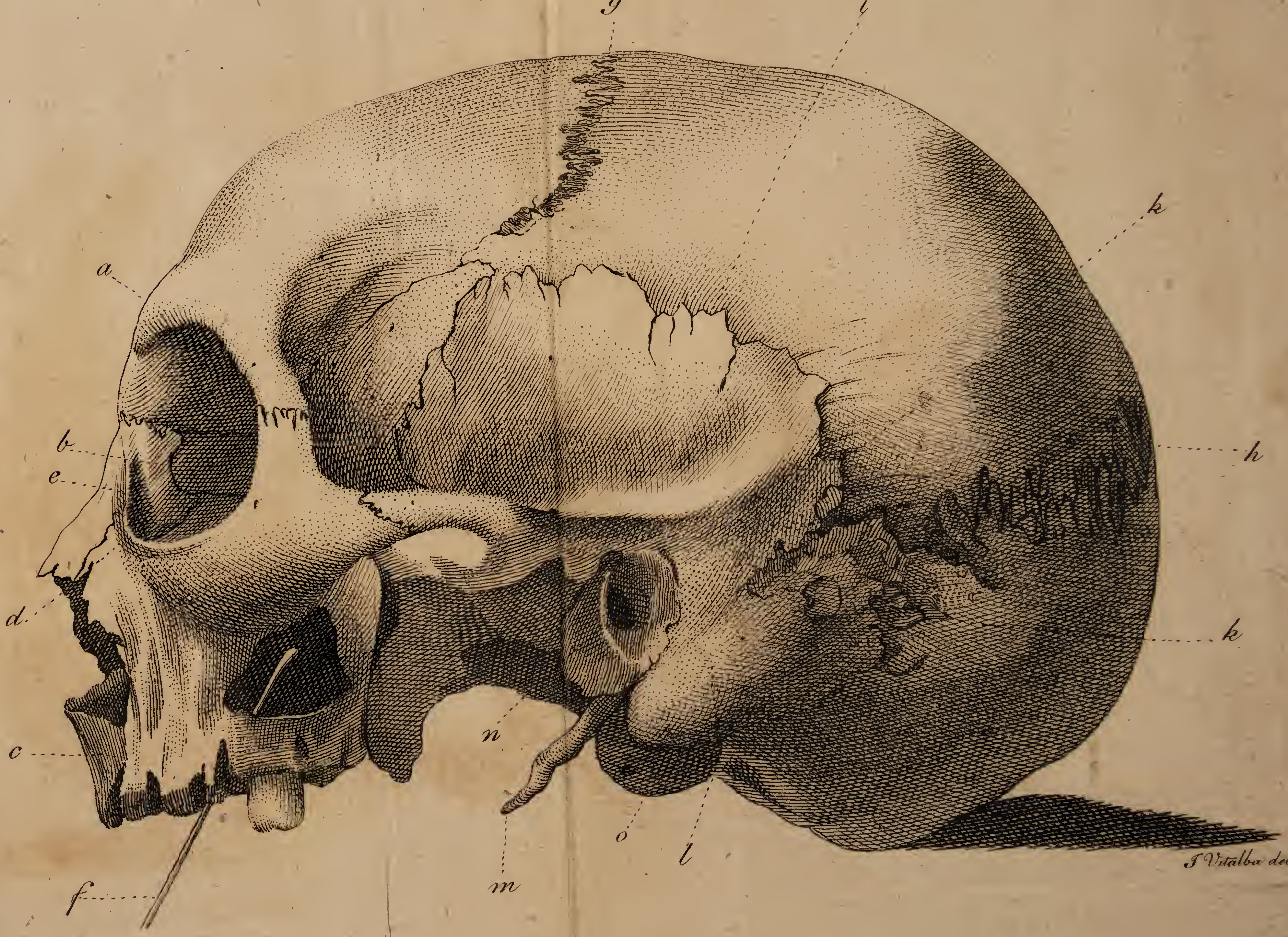
k—k, *Sutura mammillaris.* The ſituation and extent of this is ſo well deſcribed in the plate, that any farther explanation muſt be unneceſſary.—I ſhall only add, that the denudating this ſuture, and keeping it fairly expoſed by *gentian* root, or any other method the ſurgeon may think proper, is what I would recommend, when we wiſh to obtain a diſcharge from parts within the ſcull.

l, *The maſtoid proceſs.*

m, *The ſtyloid proceſs.*

n, *The meatus auditorius.*

Vol. I. Plate



the preceding plate; its courſe is obliquely backward, having paſſed between the maxillary bone, and the *conchiform*, or inferior ſpongy bone, as it is generally called, the point of the probe is ſeen reſting on the internal part of the maxillary bone that forms the roof of the mouth *b*.

c, *The frontal ſinus.*

d—The *ſphenoidal ſinus*, where may be obſerved its *ſeptum* remaining, and the cellular or ſpongy ſubſtance of the bone, which is extended backwards: if we examine the anterior connection of the ſphenoidal bone, we ſhall ſee that part of the *vomer*, which is joined with the *proceſſus azygos*, remaining in *ſitu naturali*; its connection with the *ſeptum* of the *os ethmoeides*, which, with the remainder of the *vomer*, and an intermediate cartilage, form the *ſeptum narium*; but it was neceſſary to remove them, in order to ſhew the cellular part of the ethmoid bone, and the *convoluted*, *turbinated*, or ſuperior ſpongy bone, as called by different writers, as well as the *conchiform*, or inferior ſpongy bone.

e, *The lambdoidal ſuture.* The ſpace between the terminations of the prickt lines from *f f*, ſhews the extent and ſituation of the *ſutura mammillaris*, in the concave or internal part of the ſkull.

g, The groove in which is ſituated the *lateral ſinus.*

h, *The ſagittal ſuture*, terminating in *the lambdoidal* at *i*, and in the *coronal* at *k*.

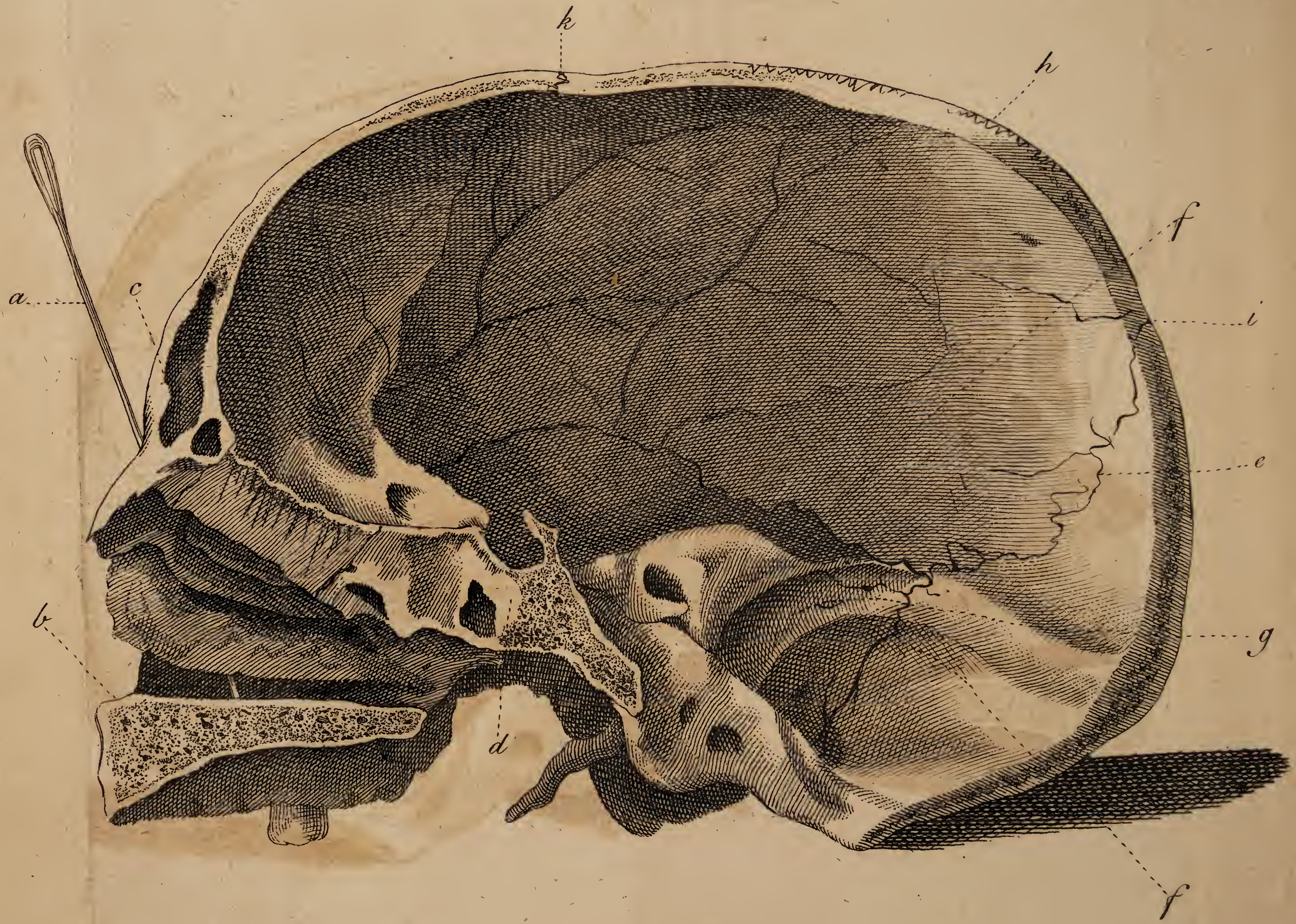
The continuation of the arched line from the anterior extremity of *the mammillary ſuture*, marks the courſe of the *ſquamoſe ſuture.* The other ramifications are *ſulci*, formed by the arteries of the *dura mater.*

PLATE III. See p. 240.

For the accuracy of the drawings of this and the following plate, I acknowledge myſelf under great obligations to my ingenious friend and moſt inimitable artiſt, Mr. *Cipriani*; and, I flatter myſelf, I may add, that the engravings of the ſeveral plates by Mr. *Vitalba*, do not diſcredit Mr. *Bartolozzi*, from whom he received his inſtructions in that art.

a, The hand of an aſſiſtant compreſſing the *ſubclavian artery*, as it paſſes over the firſt rib towards the *axilla*, in a ſubject, on whom the operation of amputating at the joint of the ſhoulder is intended to be performed.

b, *c*, The pricked lines, ſhewing, firſt, the courſe of the *ſemicircular inciſion* from the fold of the integuments *b*, that cover a part of the *muſculus pectoralis* before its implantation into the *os brachiale*; which inciſion, by bringing the knife downwards for a ſmall ſpace, is to be carried acroſs the arm, almoſt as low as the termination of the *deltoides*, and is then to be continued with ſome obliquity upwards and outwards, and end at *c*—This part of the operation marks the *lambeau* or flap



J. Vitalba del. et sculp.

c, The head of the *os brachiale* diſlodged.

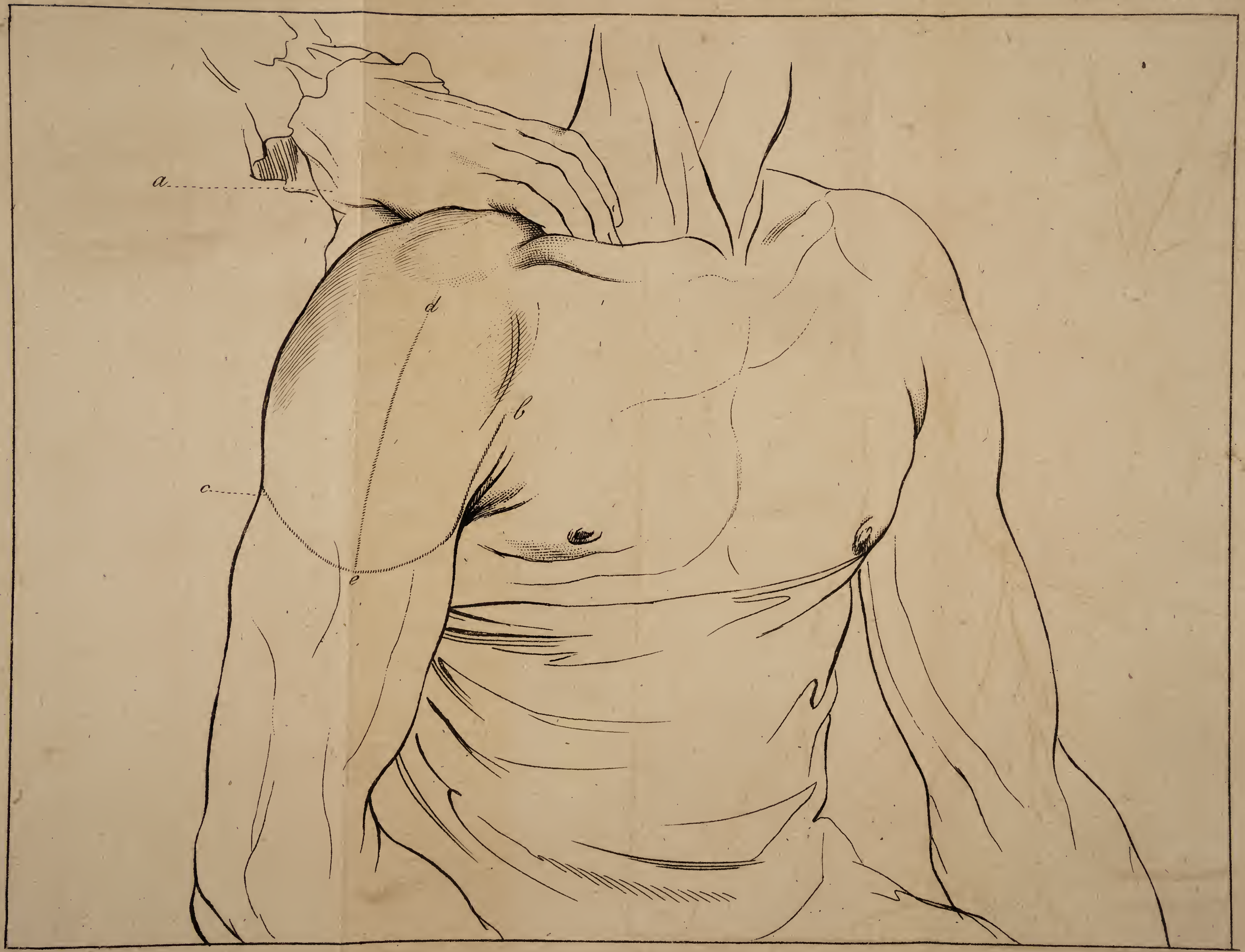
d, The *acetabulum ſcapulæ.*

e, The muſcles and integuments of the *axilla* that remain undivided.

The ligatures with the divided blood veſſels, may now be kept out of the way of the knife by an aſſiſtant, which, when done, and the head of the bone kept at a due diſtance from the body by another aſſiſtant, the ſurgeon may finiſh his operation, by cutting through the undivided parts, with a ſingle ſtroke of his knife, free from any embarraſſment.—Care muſt be taken to leave the parts in the *axilla*, of a ſufficient length to correſpond with the flap, when brought down to have the ligatures paſſed through, to obtain a union by the interrupted ſuture.

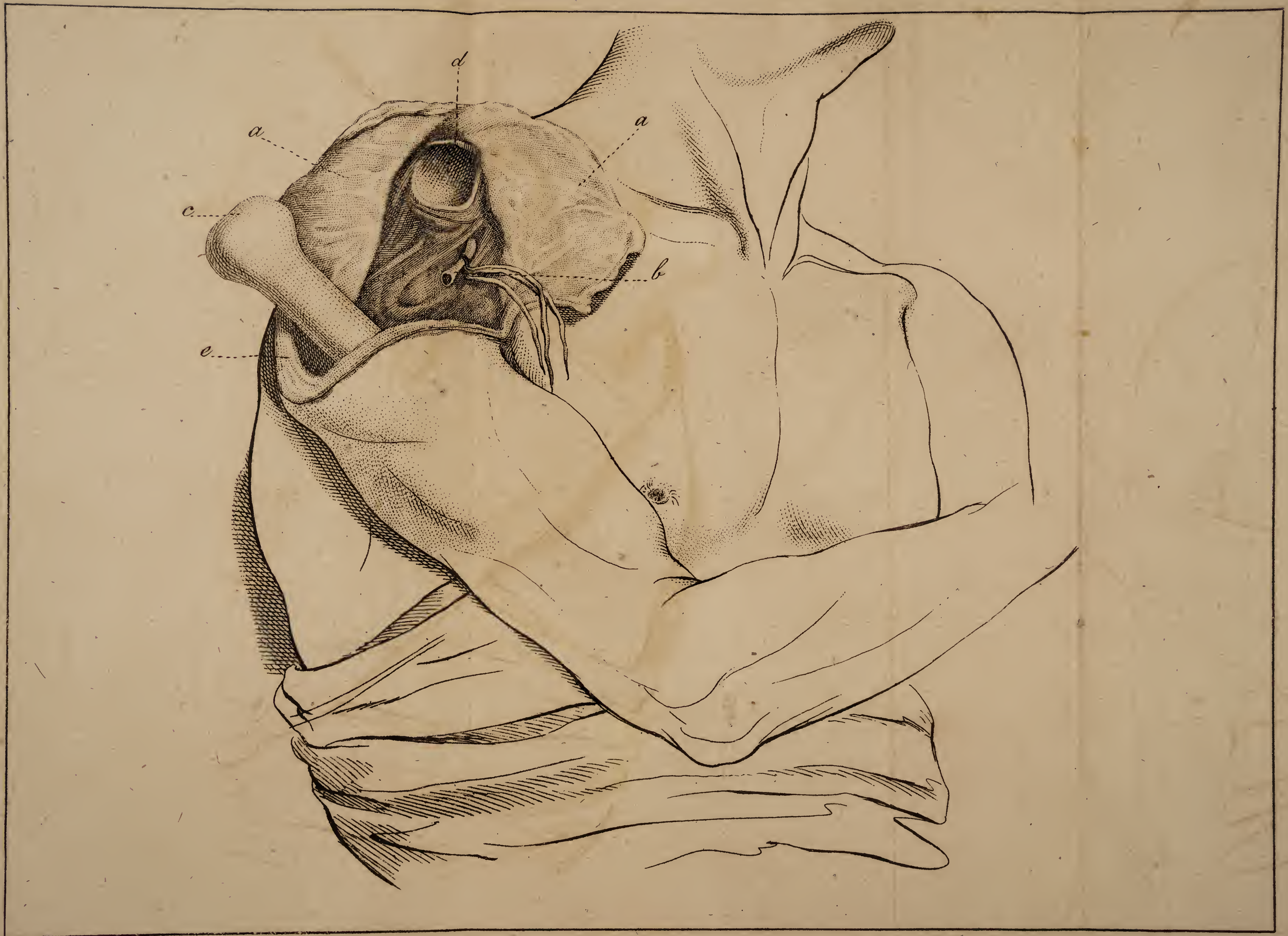
PLATE V.

Fig. 1. The inſtrument made uſe of to convey the ligatures under the large blood veſſels without the nerve, in the operation



I. B. Cipriani del.

I. Vitalba sculp.



J. B. Cipriani del

J. Vitalba sculp.

operation of amputating at the joint of the ſhoulder—it reſembles a crooked needle fixed in a wooden handle, *a*, the point of which needle is blunt. *b*, A ſlit or eye for the paſſing of the ligatures. Nearer to the handle, about an inch in length, the inſtrument is flattened and grooved on both ſides for the ligatures to reſt in, during the paſſing of the inſtrument *c c*. The advantage of this inſtrument over the common crooked needle, which cuts at the point, and is without a handle, is too obvious to need any commendation.

Fig. 2. *The Tenaculum* employed by ſeveral ſurgeons of late, to draw out the *largeſt* blood veſſels, after amputations in general, in order that ligatures may be made on ſuch blood veſſels, *without including the nerve* within the nooſe.

Fig. 3. The *Biſtouri çachè*, whoſe uſe is related in the operation of Lithotomy, Vol. ii. p. 240.

Fig. 4. The ſame inſtrument with the blade *a*, forced out by the ſurgeon's preſſing on the ſpring *b*, with his thumb; *c*, the *grooved cannula* in which the knife is concealed, as in Fig. 3.

THE END.

ERRATA.

Page 83,	line 15,	after the word *antiſcorbutic* add a comma.
88,	9,	for *luſſes* read *tuſes.*
126,	laſt,	dele the following words, *at this period of the diſorder.*
131,	18,	for *Mynſickt*'s read *Mynſicht*'s.
143,	19,	for *catilen* read *catlin.*
175,	12,	for *Longuets of leather and of cloth,* read, *Or long compreſſes of cloth, and ſlips of leather.*
238,	6,	add a comma after the word *firm,* and dele that after the word *elbow.*
242,	20,	for *ecuring* read *ſecuring.*
291,	14,	for *ſurgeon* read *ſurgeons.*
292,	16,	for *advantages* read *advantage.*
		In the note at the bottom of the ſame page, for 97 read 197.

Vol.I.Plate V

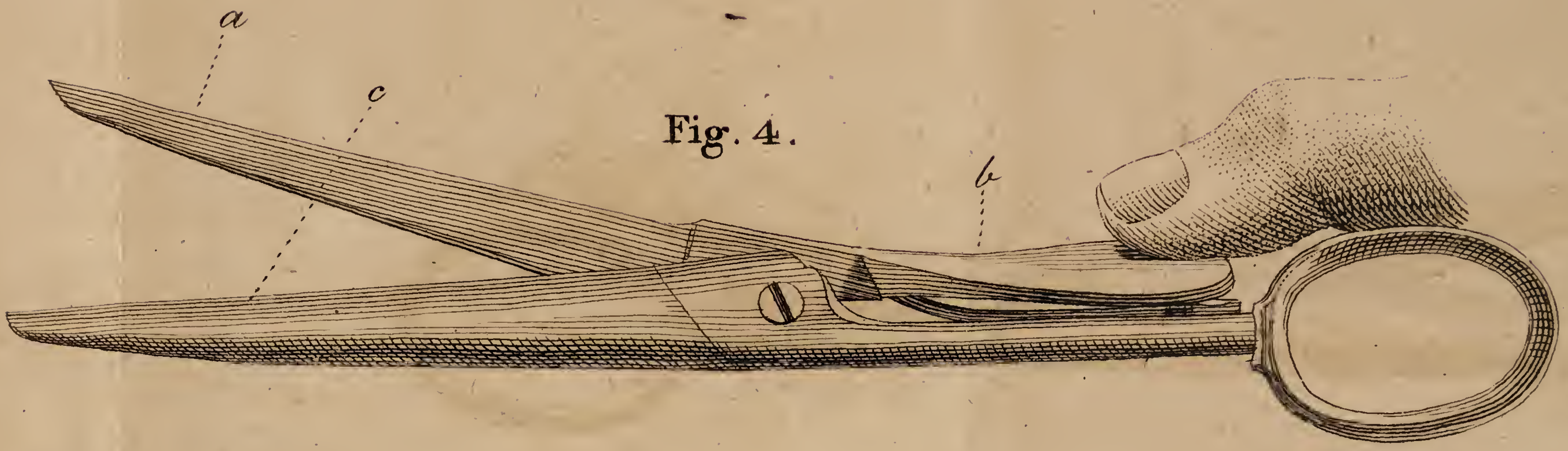


Fig. 4.

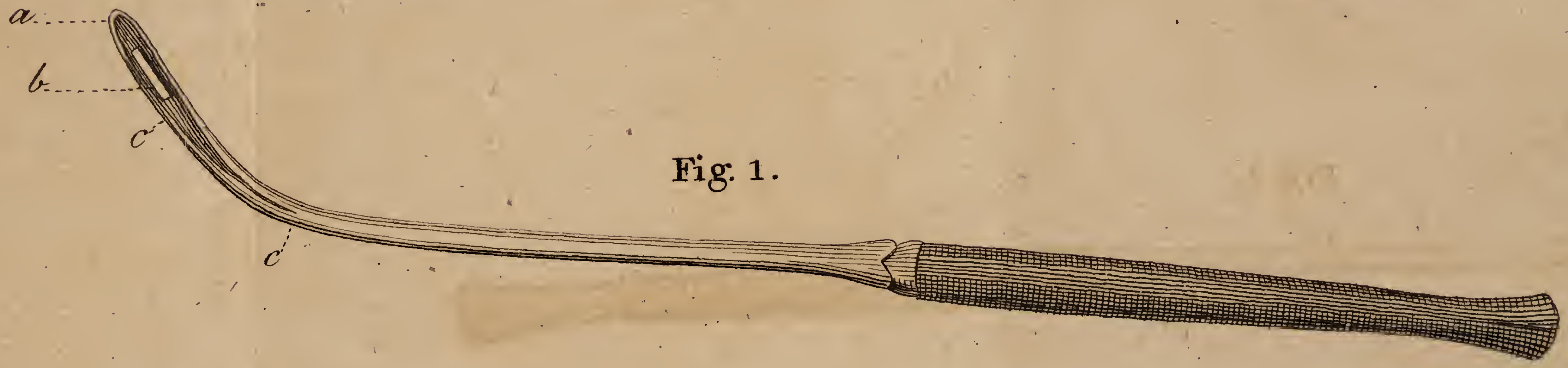


Fig. 1.

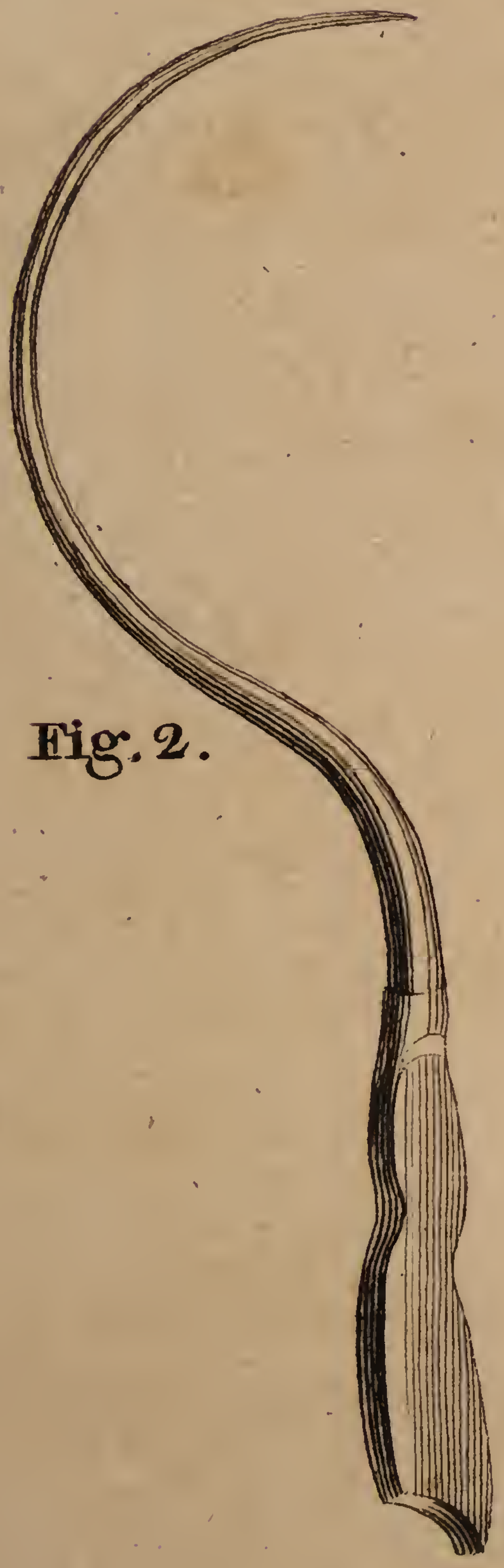


Fig. 2.

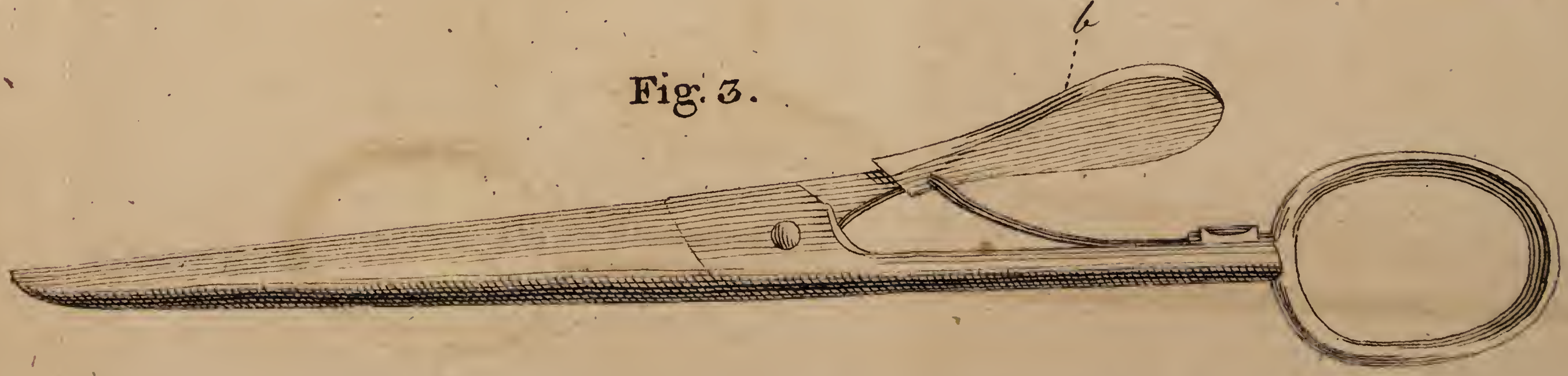


Fig. 3.